PA

Brown: plans to increase funding, but some fear a cut in the number of studentships.

in many areas, including the biological and physical sciences.

The government has not yet said how much extra money will be available to cover the increases, leading some to fear that student numbers could fall. Earlier this year the life-science community called for a pay increase, even if it meant cutting back on numbers (see *Nature* 403, 347; 2000). But the Treasury has denied that this is their intention. A spokesperson said the aim was to have more and better research students, and that "this does not mean fewer studentships".

Bob Price, the head of human and corporate resources at the Biotechnology and Biological Sciences Research Council (BBSRC), welcomed the announcement with "open arms" and expects it to raise the quality and quantity of research students.

But earlier this year John Taylor, the director-general of the research councils, decided that stipends did not have to be harmonized, and that individual councils could choose whatever level they thought appropriate. Accordingly, the BBSRC's minimum went up to £7,380 and is under review. Price says it could increase beyond the amount announced by the Treasury, but that this would "need a reduction in the number of places".

But although welcoming the money in principle, many scientists are reserving judgement until the small print is revealed later this month — particularly as the announcements appeared as a leak to two newspapers of a speech by Gordon Brown, the Chancellor of the Exchequer, and as selective details released by the Treasury.

Indeed, science may not be a net beneficiary. Money could be redistributed from other budgets, as was the case with government departmental spending (see *Nature* 404, 909; 2000), or clawed back elsewhere. The full results will be known when the government releases details of the Comprehensive Spending Review in a few weeks. ■

Tangled tale of a lost, stolen and disputed coelacanth

Heather McCabe, Paris & Janet Wright, London

Strange stories have long circulated around the coelacanth, the 'living fossil' fish discovered off the coast of South Africa in the 1930s. The latest are claims by French researchers who say they were the first scientists to find the Indonesian variety, in 1995. But the photograph they sent to *Nature* to support their claims has been denounced by another researcher as a fake.

Until recently, coelacanths had only been found on the west side of the Indian Ocean. The first recorded Indonesian sample was discovered by a US biologist, Mark Erdmann of the University of California at Berkeley, who published news of his find in *Nature* (see *Nature* **395**, 335; 1998).

In a recent submission to *Nature*, the French team — Bernard Séret, Laurent Pouyaud and Georges Serre — say they were unable to register their specimen in 1995 because it failed to reach the museum to which it had been sent. They say Serre photographed the fish at the time, then lost the picture (their only other evidence) while moving house, and only found it again this year.

But *Nature* staff noticed that the fish in the new photograph appears virtually identical to the one caught by Erdmann. When contacted, Roy Caldwell, a co-author of the 1998 paper, scrutinized the photograph via a picture-editing computer program and said, "I am 100% certain the image is a fake".

When Erdmann spotted a coelacanth off the northeast coast of Sulawesi in 1998, his find expanded the geographical distribution of the fish by roughly 10,000 km. But Georges Serre, a consultant for what is now the French Institut de Recherche pour le Développement (IRD), has long claimed that a 10-kg specimen was caught in 1995 in the Bay of Pangandaran, in Southwest Java.

Serre says he gave the specimen to a fisherman to hand over to the Indonesian fishery service. But the man gave it to a museum, from which it was stolen. Only recently, according to Serre, did Pouyaud, an IRD geneticist in Jakarta, track down the coelacanth to a private collection, whose owner refuses access to the fish.

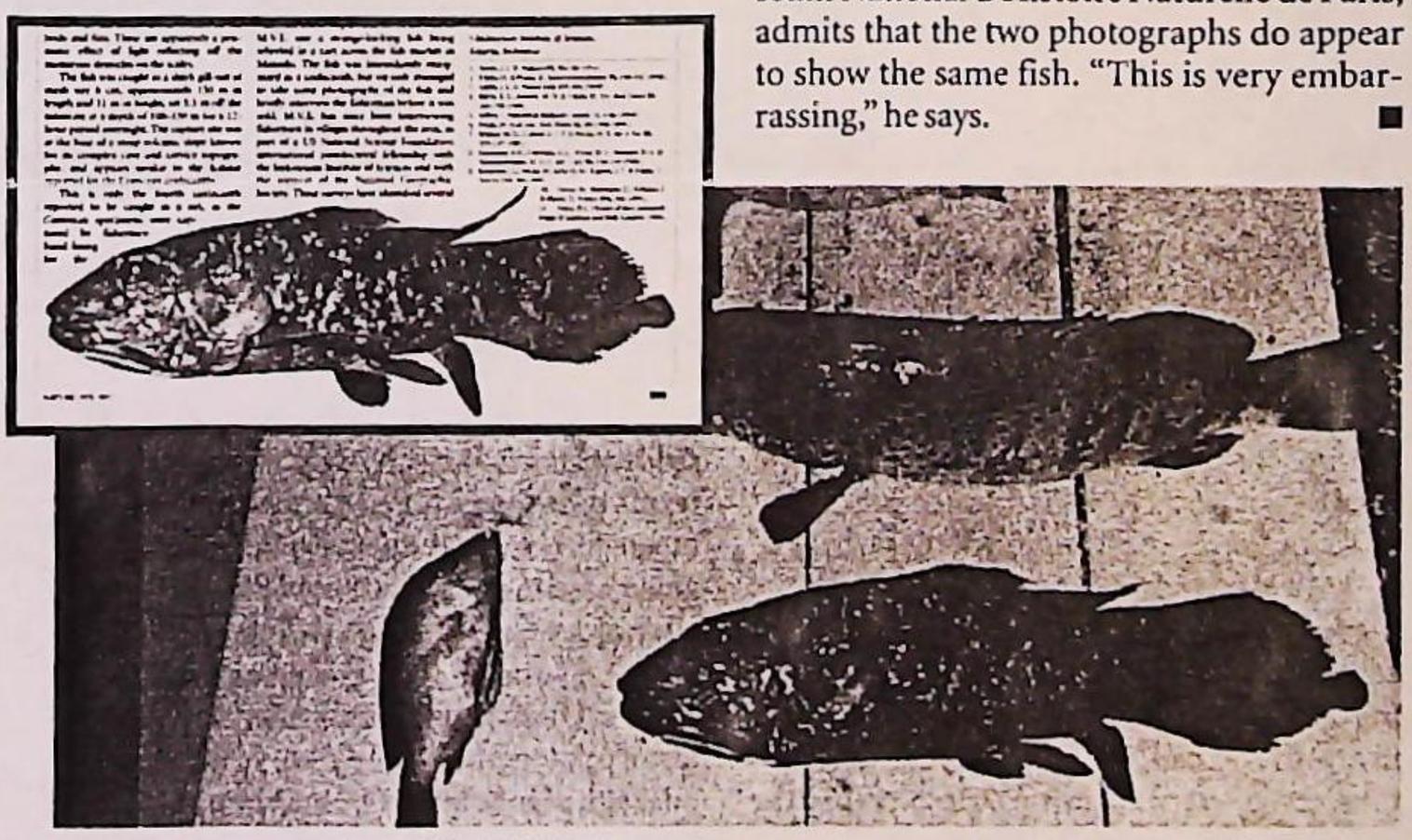
The French team's finding, if confirmed, would further extend the distribution of this elusive creature, as it was caught more than 2,000 km from the spot where Erdmann found his 1998 specimen, suggesting a large distribution in the Indo-West Pacific region.

The whole issue is already shrouded in controversy. After analysing the specimen that Erdmann had given to the Indonesian authorities, Pouyaud and his colleagues at the Indonesian Institute of Science named it as a distinct species, *Latimeria menadoensis* — to the chagrin of Erdmann, who had been analysing tissue samples independently.

Caldwell says that coelacanths have highly individual spot patterns; the pattern in the two photographs is virtually identical. The bulky fish in the 1998 photo was swimming in the sea, yet is seen in the identical position, in the new photo, while lying on a slab. Shadows and other details seen when the image is magnified add to Caldwell's impression that the new photograph has been manipulated.

Serre still claims that the photograph is authentic, though he now says it was taken by a friend who later died and whose widow gave it to Serre before moving abroad.

Séret, who is an ichthyologist at the Muséum National d'Histoire Naturelle de Paris, admits that the two photographs do appear to show the same fish. "This is very embarrassing," he says. ■



Vive la différence? The French fish (right) bears a striking resemblance to one that appeared in *Nature*.

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NATIONAL GEOGRAPHIC

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ALL BY MARK V. ERDMANN

■ NGS RESEARCH GRANT

Coelacanths: A Second Site

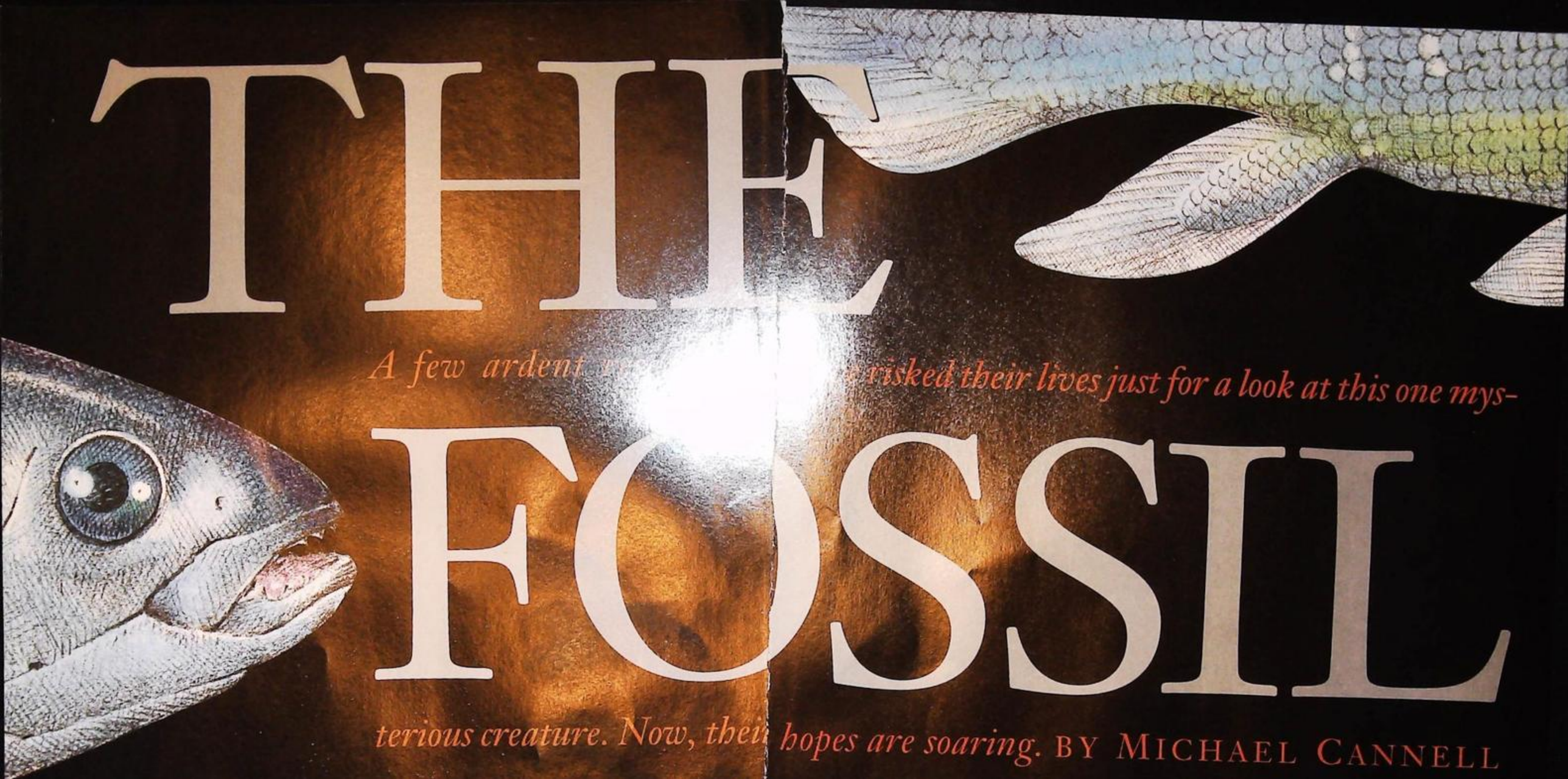
Gliding through Indonesian waters, Arnaz Mehta Erdmann swims with a strange and ancient fish, a coelacanth (above). Until now only a few hundred were thought to exist, nearly all off the Comoro Islands near Madagascar (GEOGRAPHIC, June 1988). But this coelacanth was found off Sulawesi, an island some 5,400 miles east of the Comoros.

Romance and science married on September 18, 1997, when Arnaz and reef ecologist Mark Erdmann were honeymooning in the Indonesian port of Manado. In the market they saw a cart roll by with a four-foot-long fish—which Mark immediately identified as a coelacanth. "I was intrigued by its strange shape and eerie luminescent green eyes," he recalls.

Erdmann then consulted with colleague Roy L. Caldwell at the University of California at Berkeley. Supported by Geographic research grants, Erdmann interviewed Indonesian fishermen: Did they ever catch such fish? Last July a shark netter delivered a barely alive coelacanth to his door. After being towed behind a boat, the fish revived. It is part of a separate Indonesian population, Erdmann feels certain. Its snout (above left) contains an electroreceptive organ, probably to detect prey. Gold-flecked scales (left) may be unique to this coelacanth population.

The oily, urea-laden fish is virtually inedible, but Erdmann and Caldwell worry about collectors, despite an international treaty that protects coelacanths. Indonesian authorities are working to establish safeguards. Coelacanths evolved about 400 million years ago. They were believed extinct until 1938, when one was caught in a fishing trawl.

THE FOSSIL



A few ardent [illegible] risked their lives just for a look at this one mysterious creature. Now, their hopes are soaring. BY MICHAEL CANNELL

ipelago 200 miles from Africa. The same scientists give the fish a nickname, "Old Fourlegs." (More often they use its official name, coelacanth, pronouncing it "SEE-luh-kanth.") It is the only survivor of a subclass of bony fishes that may include our ancestors. A few relatives got their appendages crawling up onto shore, rapidly evolving into tetrapods, the four-limbed terrestrial creatures that include Homo sapiens. Natural selection absorbed all the members of the subclass, changing them fundamentally or killing all of them off; all, that is, except for the coelacanth. It was, evolutionarily speaking, the one that got away.

Scientists, in fact, thought that the coelacanth had accompanied dinosaurs into extinction at the end of the Cretaceous Period some 65 million years ago. Humans knew the fish as nothing but fossil until 61 years ago, when a South African trawler unexpectedly netted a live one. The discovery sent the scientific world aflutter. Here was a living fossil, unchanged over hundreds of millions of years. The fish became an instant media star. Ogden Nash wrote a poem about it. ("It jeers at fish unfossilized/As intellectual snobs elite/Old Coelacanth, so unrevised/It doesn't know it's obsolete.") It went on to inspire the horror film *The Creature from the Black Lagoon*. To this day, while science relentlessly parses the human genome and picks at ever smaller bits of matter, the coelacanth retains its throwback status as a scientific enigma, a defiant mystery. How did it survive when its cousins died off? Why does it dwell off a few isolated islands and practically nowhere else? Does its presence suggest that other exotic creatures await in the ocean's dark recesses? More urgently, how can scientists keep the creature from going extinct before they can solve its mysteries?

The coelacanth may be the most sought-after creature on Earth (excluding such cryptozoological ephemera as the yeti and the Loch Ness Monster.) No other animal so alluringly combines elusiveness with an unbeatable pedigree—*older than dinos! Our long-lost relative!* Expeditions are scrambling to catch coelacanths for research, or to draw record crowds of ticket-buying aquarium-goers. Japan's Toba Aquarium backed a $1.76 million juggernaut to bring the fish back alive. The prospect appalls some scientists. The fish already resides on the endangered species list. Critics warn that the ongoing coelacanth-fishing derby could turn the living fossil into a dead one. "The coelacanth is our closest living relative in the fishy world," says John Maisey, a curator of vertebrate paleontology at the American Museum of Natural History in New York. "If it goes extinct, 400 million years of history are lost."

There clearly is cause for alarm. Coelacanth trackers are using the latest in sonar and submersibles. Even more effectively, they're offering generous bounties to native fishermen who haul the fish in alive. But don't expect to see any coelacanths in an aquarium near you—not just yet. While the people pursuing them are the most zealous anglers in the world, they may also be the least successful. "It is the holy grail of ichthyology," says John McCosker, director emeritus of San Francisco's Steinhart Aquarium. The fact is, no Westerner has caught one since that original find, 61 years ago.

Grand Comore
COMORO ISLANDS
MADAGASCAR
SOUTH AFRICA
Capetown
*Most of the 100 or so coelacanths caught since 1938 were found along the west coast of Grande Comore.
East London, where scientists first encountered the coelacanth in 1938.

"Don't think me mad, but I believe there is a good chance that it is a type of fish generally thought to have been extinct for millions of years."

IT WAS A HOT DECEMBER DAY IN 1938, when Captain Hendrik Goosen steered his trawler into the South African fishing port of East London. He had been trolling five miles off the mouth of the Chalumna River where the sea floor drops to 6,000 feet. As was his custom, he dumped the inedible catch aside for Marjorie Courtenay-Latimer, the young curator of a local natural history museum. The pile contained the usual refuse—rays, sharks, and redfish—and a large dead fish nobody aboard had ever seen before. The deckhands called it a "sea lizard" because its fins resembled legs.

When Courtenay-Latimer saw the curious fins, she pushed aside the surrounding pile to reveal "the most beautiful fish I had ever seen, 5 feet long and a pale mauve blue with iridescent silver markings." She recognized it as a rare find, whatever it was. She prevailed on a reluctant cab driver to rush her and her decomposing passenger back to the crudely equipped museum. She knew she had to act fast before the oppressive midsummer heat decayed her prize. She photographed the fish, then carted it through the streets on a borrowed wheelbarrow in search of help. Both the mortuary and a cold-storage warehouse turned the reeking carcass away. Finally, in desperation, she delivered it to an elderly taxidermist who wrapped it in formaldehyde-soaked cloths and paper.

Courtenay-Latimer knew that her specimen matched primitive fishes she had seen in texts, but she felt unqualified to venture an identification. She sent a sketch and written description to J. L. B. Smith, South Africa's preeminent ichthyologist. An eccentric and obsessive 41-year-old professor at Rhodes University in South Africa, Smith received the letter at a remote seaside cottage where he was correcting exams over Christmas break. He suspected that she had made a breakthrough discovery—her sketch was a dead ringer for the ancient coelacanth—but the fish was a *fossil*; no creature of that size or complexity had ever before risen Lazarus-like out of the depths of evolution. Smith was clearly shaken by the implications. He paced around the house until his wife expressed her concern for him.

Prize Catch

In passionate pursuit of the ancient coelacanth for 14 years, Professor J.L.B. Smith (left, center of photo) at last met his catch. Smith was so overcome, he wept openly. While transporting his prized specimen, Smith refused to leave its side. He even slept next to the crate holding the fish's remains (below).

"Don't think me mad," he replied, "but I believe there is a good chance that it is a type of fish generally thought to have been extinct for many millions of years."

His speculation was far from insane, as he proved later. But the fish itself may have contributed to a decline in his sanity that accelerated from that point on. An ambitious man, Professor Smith understood that presenting a live coelacanth to the natural history establishment could make his reputation. It could also break it. He was reluctant to bet his credibility on a single specimen, and he agonized for weeks over his involvement. "Those were awful days, and the nights were even worse," he recalled in a memoir he wrote years later, titled *Old Fourlegs*. "I was tortured by the doubts and fears...Yes, everything was against its really being a coelacanth...and yet every time I took out that sketch, it said 'yes,' emphatically 'yes.'"

Finally, in mid-February, Smith and his wife embarked on the weeklong drive to East London.

PHOTOGRAPHY THIS PAGE: J. L. B. SMITH INSTITUTE OF ICHTHYOLOGY/NATIONAL GEOGRAPHIC SOCIETY

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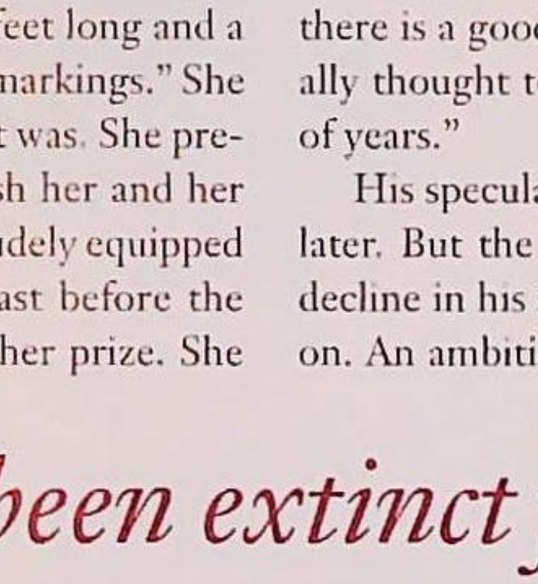

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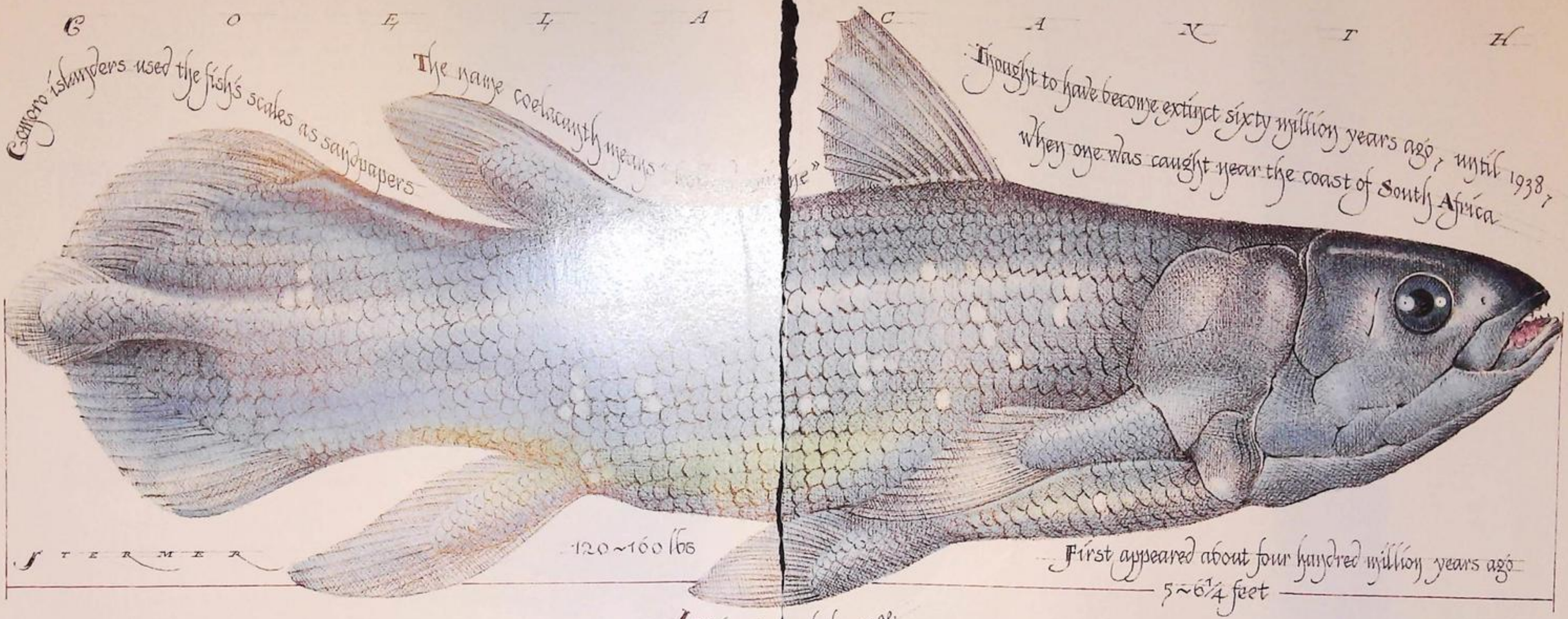
Gallero fishermen used the fish's scales as sandpapers
The name coelacanth means
J. L. B. SMITH
120~160 lbs
Latimeria
chalumnae
Thought to have become extinct sixty million years ago, until 1938,
when one was caught near the coast of South Africa
First appeared about four hundred million years ago
5~6¼ feet

The fish is a sluggish, 5-foot-long predator with steel-blue scales, silvery spots, and an unspellable name.

They arrived to find that most of the fish had been removed. The taxidermist had been unable to find a container large enough to preserve the specimen in formaldehyde. With the fish in danger of decomposing, he had no choice but to discard the viscera. There was nothing left for Smith to examine but the bones and armorlike scales. To make matters worse, Courtenay-Latimer's photographs came back from the film lab unreadable.

While these were considerable setbacks from Smith's standpoint, one look at the stuffed remains confirmed beyond doubt that the species was, in fact, a coelacanth. "Although I had come prepared, that first sight hit me like a white-hot blast and made me feel shaky and queer," Smith wrote in a characteristically nervous tone. He went up to the stinking, formaldehyde-soaked remains and stroked the skin gently while his wife looked on in silence.

Smith shipped the specimen by train, under police escort, back to Rhodes University, where he dissected the remains. He formally announced his findings in a short article, "A Living Fish of the Mesozoic Type," published in *Nature*, an esteemed London journal. But news of his discovery had already leaked. Smith had reluctantly allowed a local paper, the *East London Daily Dispatch*, to photograph the fish. Papers around the world reproduced the picture. Headlines billed the coelacanth as a living fossil and missing link. The *London Illustrated News* called it "One of the Most Amazing Events in the Realm of Natural History in the Twentieth Century." *LIFE* magazine saluted it as a "clue to evolution." Scientists everywhere weighed in with opinions on the find's significance.

Back in East London, a museum trustee gave Courtenay-Latimer a letter to type up. She was appalled to find that it was an offer to donate her cherished specimen to London's British Museum. She refused to type it. In the end, the specimen stayed in East London, South Africa, where it is still on display.

For all the sensation it provoked, the disemboweled coelacanth revealed very little about itself. But if there was one coelacanth, Smith reasoned, there must be more. He now devoted much of his energy to finding a second, intact specimen. Over the following years, the Smiths toured the East African fishing ports—on the coasts of Zanzibar and Pemba, Mozambique, Tanganyika, and Kenya, among other destinations—talking to local officials and fishermen. They distributed thousands of leaflets printed in French, Portuguese, and English showing a picture of the fish and offering a $280 reward. ("Look carefully at this fish. It may bring you good fortune.")

On December 24, 1952, Smith and his wife were returning by steamship to Cape Town with tons of fish—none of them a coelacanth—collected during a strenuous five-month trip up the coast. They disembarked in Durban to find an urgent telegram sent by schooner captain Eric Hunt from the Comoros island of Dzaoudzi. Hunt had wired to say that he had a coelacanth. An observant teacher found it in a market, then carted it 25 miles over hilly country to Hunt's ship. Hunt packed it in salt and injected it with five liters of formaldehyde.

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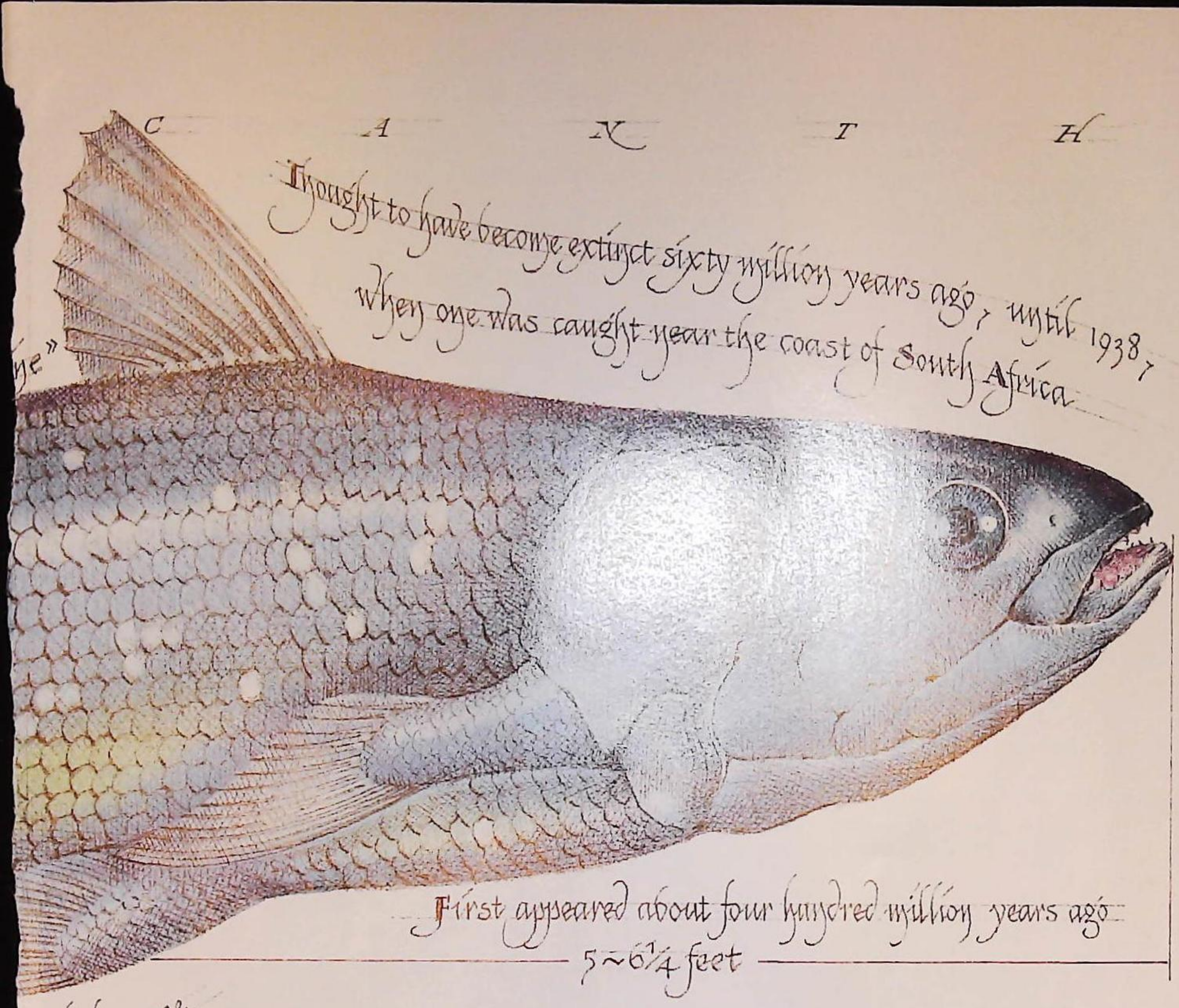
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minister, Daniel F. Malan, and presented the case as a matter of national interest. Malan offered the use of a military plane. Thirty-six hours later, Smith took off for Pamanzi Island on a DC-3 and collected the fish, the culmination of a 14-year search. He did not underreact. "My whole life welled up in a terrible flood of fear and agony, and I could not speak or move," he recalled. He knelt to caress the fish. "I found tears splashing on my hands and realized that I was weeping and was quite without shame."

Upon arrival in Capetown, Smith unveiled his catch under a tree on the lawn of Prime Minister Malan's residence. "You mean to tell me," asked the prime minister, "that we looked like that 300 million years ago? It's very ugly."

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Of the coelacanth seekers, one who arouses Fricke's special ire is Jerry Hamlin. Over the last 13 years Hamlin, a 55-year-old Connecticut filmmaker and robot designer, has launched seven expeditions to the Comoros. He has offered a $200 bounty for live specimens. He even built a full-scale robotic coelacanth, named Nemo, to inspire the fishermen. Hamlin may be the most patient fisherman in the world: Despite all his efforts, he has seen only one live coelacanth.

It was, tantalizingly, during his first trip to the islands, in 1986. He was sound asleep in his room at Le Coelacanthe Hotel when two fishermen woke him at dawn. They had a freshly caught coelacanth, still alive and gulping violently every four seconds. "I knew the sunlight was bad for it, so I shielded its eyes with [illegible]' Hamlin says. He had a diver return the [illegible] to the deeps, but it died within minutes.

He was lucky to see one at all. The fish surface only on those rare occasions—half a dozen times a year—when native fishermen paddling dugout canoes accidentally haul them up on baited 800-foot hand lines. The meat is too oily to eat. Still, the creature is not entirely useless. Comorans use the scales as sandpaper to roughen bicycle inner tubes before applying a patch. Or, if he happens to know a Westerner like Jerry Hamlin who is willing to pay handsomely, the fisherman may deliver it, gasping and on the brink of

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PETER SCOONES/PLANET EARTH PICTURES

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The coelacanth was first sighted by Westerners in 1938, when South African fishermen hauled it from the depths. A local naturalist called it "the most beautiful fish I had ever seen." The fishermen called it a "sea lizard."

PETER SCOONES/PLANET EARTH PICTURES

Hamlin had hopes to change that statistic. In the late 1980s, he began experimenting with ways to stabilize a live coelacanth long enough to transport it to the New York Aquarium. The closest he came to succeeding was in 1995, when a fish was kept alive for ten hours in a chilled 800-gallon rescue tank he built under a tent on the beach. The tank was later wrecked by vandals while he was away. "Sometimes I wonder why I'm doing this," Hamlin confesses. "I've invested so much—about $100,000—that I'm reluctant to withdraw. It's become my personal Vietnam."

Hamlin answers critics like Fricke by defending his quest as an effort to revive coelacanths that would otherwise die. "We offered the fishermen money as an incentive to keep the fish alive," he says. "Otherwise they whacked and gaffed the fish and ran rope through their gills." If the stock dwindles, Hamlin warns, captive breeding may be the only way to ensure the species' continuance. Besides, while nobody doubts that coelacanths are imperiled, some ichthyologists suspect Fricke of overstating the danger. "It's a poorly known part of the world, and very hard to conduct a survey," the Steinhart Aquarium's John McCosker said last year. "It wouldn't surprise me if coelacanths are considerably more common than thought when they were given endangered status."

Positive ID

When scientists compared the the tail of a live coelacanth with that of a 140-million-year-old fossil, they found it to be an identical match.

DR. HANS FRICKE/NATIONAL GEOGRAPHIC SOCIETY

In fact, McCosker's hunch proved correct. Last September a UC-Berkeley postdoctoral biologist named Mark Erdmann announced that he had found a second population of coelacanths 6,000 miles from the Comoros, on the far side of the Indian Ocean. His wife, Arnaz, spotted one being wheeled on a handcart through a market in Manado, on the Indonesian island of Sulawesi, during their honeymoon two years ago. The Erdmanns were reluctant to store a rotting fish in their hotel room; all they could do was photograph the specimen before they left. The Erdmanns later returned to Manado in search of more coelacanths. They found Indonesian fishermen well-acquainted with the fish, which they call "raja laut" or "king of the sea." Last July, a fisherman brought them a living coelacanth. They took the fish to the water just in front of their house, donned dive gear, and swam with it in about 30 feet of water. The fish did not look well. "It was clearly dying," says Arnaz Erdmann says. "It needed some help balancing from time to time." Three hours later, it was dead.

The fish's difficulty in surviving outside its icy habitat—and the steadily rising criticism of efforts to capture it—have caused Jerry Hamlin to refocus his efforts. Instead of catching coelacanths, he will attempt to keep them alive in the wild. Last year, the Web site for his "Coelacanth Rescue Mission" invited readers to submit alternative rescue plans. A Florida biologist won the $500 prize for the winning proposal, a kit designed to speed weakened fish back to the icy depths. It consists of a line tied to a barbless hook and a sack—all contained in Ziplock bags sewn to the backs of T-shirts. Hamlin distributed 200 free rescue kits to fishermen last spring. A fisherman who has caught a coelacanth is supposed to place the barbless hook in the fish's jaw and lower it with the weighted sack. When sack hits bottom, the fisherman is to free the fish by jerking the hook from its mouth.

THE TICKET

For more on the coelacanth's history and preservation efforts, visit the Web site www.dinofish.com.

Hamlin hopes to appraise the program in person this winter. In the meantime, he is finishing a documentary film about his 13-year campaign tentatively titled *The Fish Out of Time: A Coelacanth Odyssey*.

Will Hamlin's fish story play as a eulogy or rallying call? If the optimists are correct, there are plenty of coelacanths to rally to. If the doomsayers are right, on the other hand, the longest of fish stories will come to an abrupt and unsatisfying end, and the coelacanth will for all time be the greatest fish that ever got away. ★

MICHAEL CANNELL *is a contributing editor to* ATTACHÉ. *He lives in Manhattan, where he carefully studies the Hudson River.*

http://www.discover.com

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THE WORLD OF SCIENCE

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Number 1

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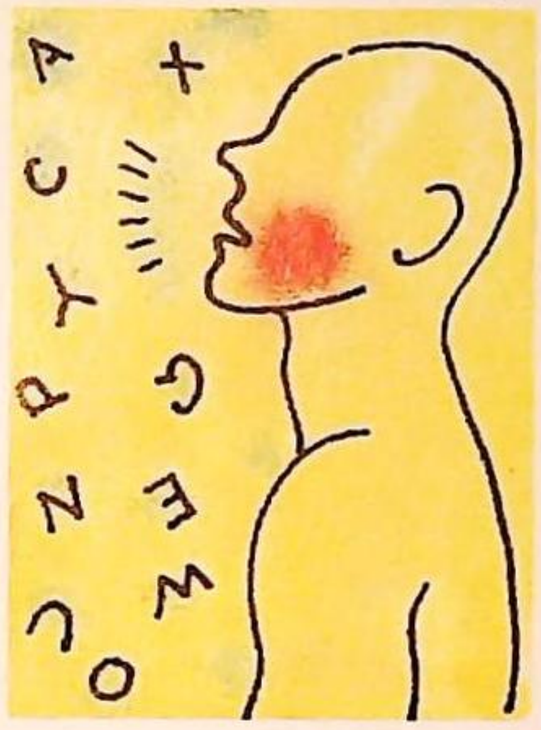

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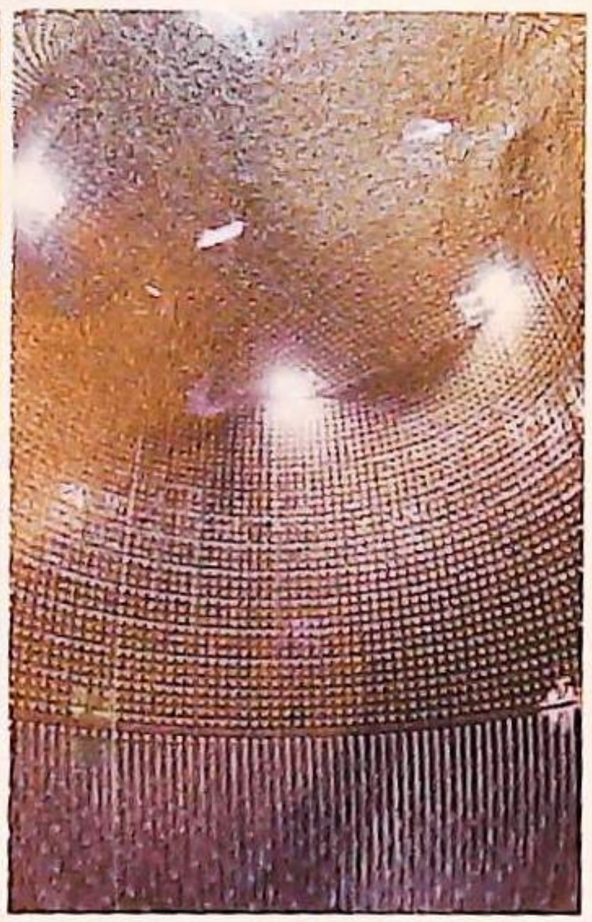

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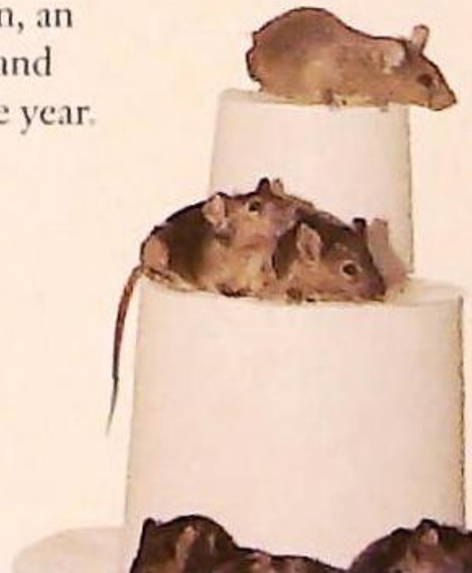

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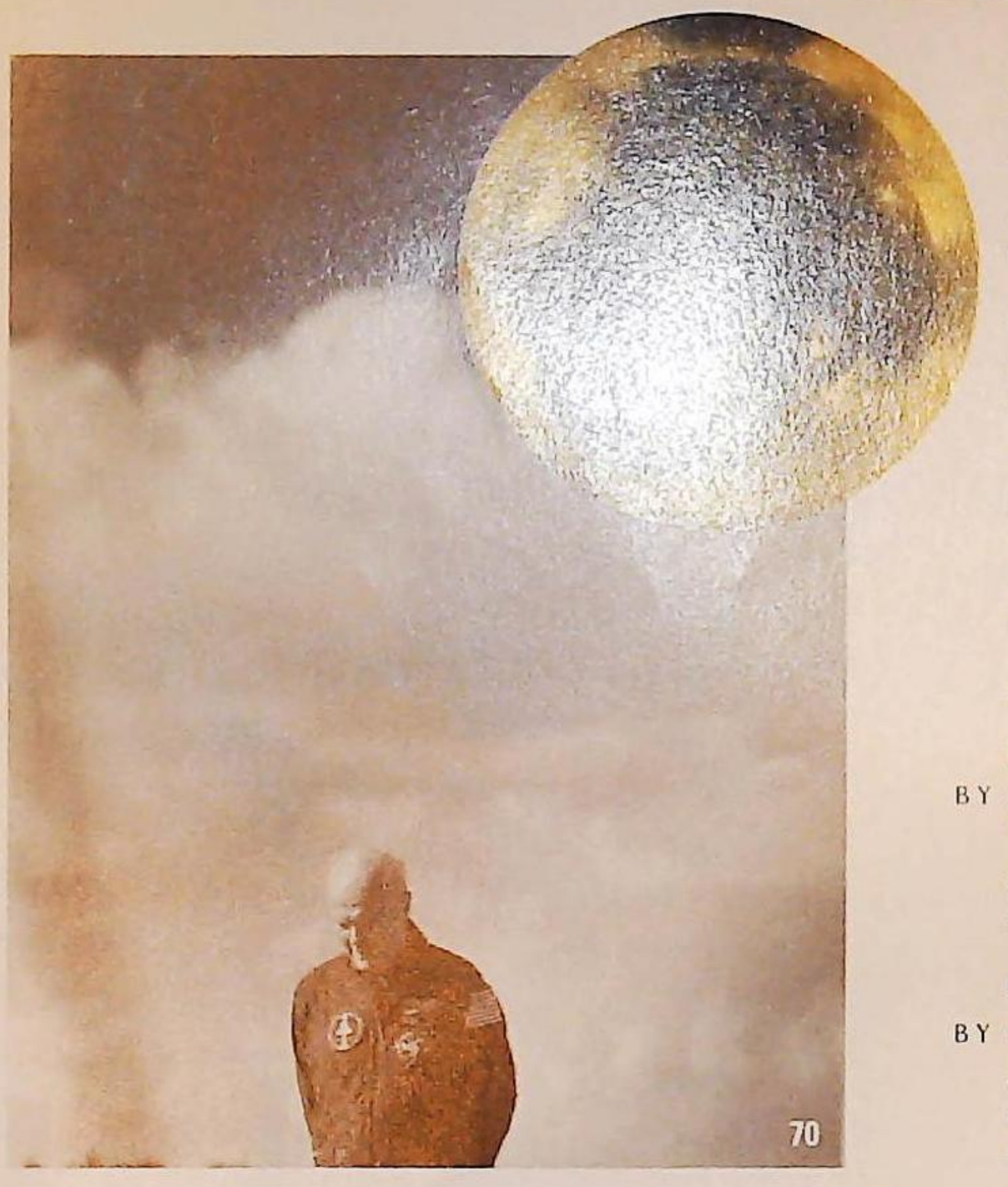

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PATRICIA GADSBY
("*Fear of Flu*," page 82) is a contributing editor of DISCOVER. "I was familiar with Southeast Asia's 'wet' markets but was quite unaware of the live bird markets under my nose in New York," she says. "There are over 70 in the metropolitan area, selling not only live birds but goats and other animals. I spent a sweltering morning changing in and out of paper jumpsuits, following two inspectors of the New York State Department of Agriculture and Markets who were swabbing chickens in the Bronx."

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(*Vital Signs*, page 18) is a neuroscientist and the Harvard Brain Tissue Resource Center's National Spokesperson for the Mentally Ill. "I'm called the Singin' Scientist," says Taylor, who travels the country with her guitar, educating people about the beauty of the human brain. "There's a shortage of brain tissue for research," she says. "I try to talk to families about this, but the tension in the room is pretty thick when they realize 'Oh my God, she wants my brain!' That's why I wrote 'The Brain Bank Jingle.'"

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("*The El Niño Factor*," page 98) is a senior editor of DISCOVER, the winner of the 1997 American Institute of Biological Sciences Media Award, and the author of *At the Water's Edge.*

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the two new fossils with *Velociraptor*, a sleek dinosaur considered by many researchers to be a close relative of birds, as well as *Archaeopteryx* and other primitive birds. The analysis produced a sort of family tree, with its first split coming between the lineage leading to *Velociraptor* and the line leading to all the other dinosaurs and birds. *Protarchaeopteryx* branched off this line soon after that, and then *Caudipteryx*'s ancestry split away from that of *Archaeopteryx* and all modern birds. In other words, the Chinese fossils were dinosaurs. That meant that feathers, apparently, cloaked dinosaurs long before birds arose, perhaps functioning as a layer of insulation or as courtship display. Only later did protobirds adapt them for flight.

Skeptics of the bird-dinosaur link have long pointed out that what appear to be the closest relatives to birds lived 80 million years after *Archaeopteryx*. "The timing is a real problem," says ornithologist Alan Feduccia of the University of North Carolina. The new fossils don't resolve the gap. Feduccia suggests that the pre-Ostrom idea still holds and that the Chinese fossils are early, flightless birds. "*Caudipteryx* is really just an old kiwi."

Currie admits at this stage there are still shaky branches on his tree, but the classification of the Chinese finds as feathered dinosaurs is not one of them. Feduccia's scenario creates an even bigger disparity with the fossil record and requires that the Chinese animals independently evolved many dinosaurian traits. "It's good to have a dissenting voice that says, 'Hey, there's more than one possibility here,' because it makes you look at the specimens harder," says Currie. "But some of these arguments are simply drifting into the realm of silliness." *—Josh Fischman*

The Old Fish of the Sea

MARINE BIOLOGIST Mark Erdmann was walking through a market in the city of Manado on the Indonesian island of Sulawesi when he was brought up short by a fish. In a cart being wheeled past him was a bizarre coelacanth, one of the most famous, yet most elusive, fish on the planet. Sporting fleshy, limblike fins, it originated 400 million years ago from the same stock of fish that gave rise to the ancestors of land-dwelling vertebrates called tetrapods. Among living animals, only lungfish are closer kin to tetrapods. But until just 60 years ago, no one knew that coelacanths were among the living—they were thought to have been extinct for some 80 million years. Then in 1938 fishermen hauled in a live specimen off the coast of Cape Town. Since then the fish have been found in a few other patches of the ocean near Madagascar, Mozambique, and the Comoro Islands. On the whole, biologists viewed these populations as tiny remnants of a once-great dynasty.

Thus, to see a coelacanth 6,200 miles away from its known habitat was decidedly odd. Unfortunately Erdmann was unable to buy and study the fish in the cart—he was on his honeymoon at the time—but he was so intrigued that he spent ten months interviewing local fishermen in search of another specimen. (Along the way he learned that on Sulawesi the fish is called *raja laut*, meaning "king of the sea.") His persistence was rewarded this past July when a four-foot, 64-pound coelacanth (shown here) was caught in a deep-set shark gill net placed off the volcanic island of Manado Tua.

Mark Erdmann

"It's a very important discovery," says Roy Caldwell, Erdmann's postdoctoral sponsor at the University of California at Berkeley, "because coelacanths are in serious trouble in the Comoros—the population has probably halved in the last ten years. People there fish for oilfish and catch coelacanths as a by-product."

Erdmann froze the Indonesian coelacanth shortly after its death, and a genetic analysis of its tissues is now under way to compare it with the African populations to see if it's a separate species or not. "If they are related," says Caldwell, "I'd bet Indonesia is the source population." An ocean current flows from the Philippines past the Sulawesi Sea, through the Makassar Strait, and into the Indian Ocean, where it travels westward, to the Comoros.

—Josie Glausiusz

Attaché

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LIVING FOSSILS RETURN

It's nice to think that *FT* played a part, however small, in predicting the discovery of a second colony of cœlacanths. LOREN COLEMAN explains.

The darling of cryptozoology – the cœlacanth – is back in the news. First found in 1938, the cœlacanth was heralded around the world as a living example of a prehistoric fish known only from its fossils which dated back 400 million years. The cœlacanth was assumed to have become extinct around 80 million years ago – until a fisherman pulled the first-known modern example from the waters near the Comoros Islands near Madagascar. Marjorie Courtney Latimer, then a taxidermist at the East London Museum, came across it in a fish market.

Startlingly, to Western scientists at least, a second population of cœlacanths has been discovered off the coast of Indonesia, some 7,000 miles (11,200km) from its only previously known location near Madagascar. Of course, the local people knew about them all along.

And where was the first specimen of this new population found? It's a case of history repeating itself. Coming to the end of a honeymoon in Bali, marine biologist Mark Erdmann and his new bride decided to visit a fish market in Manado, on Sulawesi, to look for manta shrimp, the animal he studies.

"His wife pointed out a large, ugly fish going by on a handcart, which he looked at and immediately recognised as a cœlacanth," said Roy Caldwell, a biologist at the University of California-Berkeley. At 4ft (1.25m) long, Erdmann thought it would be a major hassle to deal with since he was at the finish of his stay. He didn't want to cancel his departing flight and attempt to take the smelly fish back with him, so he took some snapshots. (If I saw a cœlacanth in a fish market, I might try to make some alternative arrangements and try to preserve such a "catch"!)

As a marine biologist attached to UC-Berkeley, Erdmann could not have been happier to show off his honeymoon pictures to the folks back home. Soon, Erdmann was able to obtain some grant money and went back to see if he could find more cœlacanths in Indonesia. His team quickly set to work asking if there were any fishermen throughout the north Sulawesi region who might have seen the fish before, duplicating the efforts that Dr J L B Smith, teacher of chemistry turned cœlacanth hunter, had used in finding the second Comores specimen in 1952.

Erdmann's investigation turned up reports of a big but rare fish, up to 6.5ft (2m) long and weighing up to 143lb (65kg). It was known locally as *raja laut* (Malay: 'king of the sea'). Finally – on 30 July 1998 – fishermen netting for deepwater shark off the young volcanic island of Manado Tua caught and delivered a *raja laut* to Erdmann. Although near death, the cœlacanth remained alive long enough for Erdmann to film it swimming for three hours before freezing it for later analysis. The Comoros' cœlacanths are deep blue with white spots, while the new Indonesian variety appear to be much bigger and brown with white spots.

Erdmann and his co-authors, Prof. Roy Caldwell and Dr M Kasim Moosa, write about the remarkable discovery in the 24 September 1998 issue of *Nature*. They note that the cœlacanths recently found in Indonesia apparently live in the same type of environment as those found in the Comoros, caves about 600ft (18m) deep along the steep sides of underwater volcanoes. Their hope is that more colonies might be discovered now that scientists know where to look. The fish were probably "habitat specialists", choosing young volcanic islands with steep sides full of crevices and caves, conditions which exist in both Manado Tua and the Comoros.

THERE IS A TANTALISING POSSIBILITY THAT AN UNKNOWN CŒLACANTH IS LURKING OFF THE COASTS OF AUSTRALIA

PALNET EARTH

As any reader of *Fortean Studies* (volume 2) knows, Michel Raynal and Gary Mangiacopra have been alerting cryptozoologists since 1995 to reports of cœlacanths in supposedly 'unusual' locations (ie anywhere but the Comoros). In updating this for his website (perso.wanadoo.fr/cryptozoo/coel_eng.htm) Raynal seems to have anticipated the vicinity of the new discovery. He writes:

"Quite recently, Bernard Séret, an ichthyologist at the Muséum National d'Histoire Naturelle de Paris, gave me information on a more detailed case : 'A friend of mine – a consultant in fisheries (he has thus a good knowledge of fishes) – claims he saw cœlacanth in a village of fishermen in Indonesia, some years ago. Unfortunately, he has no photographic document to prove his testimony!'"

Placed alongside some intriguing reports of large cœlacanth-like scales found in Australia, Raynal concludes: "... there is a tantalising possibility that an unknown cœlacanth is lurking off the coasts of Australia – a possibility which seems more likely than stray individuals swimming across the Indian Ocean."

Reports of other cœlacanth populations from around the world – something cryptozoologists have talked about for years – will now be taken more seriously.

LOREN COLEMAN IS A CRYPTOZOOLOGIST, UNIVERSITY PROFESSOR AND THE AUTHOR OF *CURIOUS ENCOUNTERS* (1985) AND *TOM SLICK AND THE SEARCH FOR THE YETI* (1989).

THE LOCH NESS MONSTER-CŒLACANTH CONNECTION

It is not well known that Professor Roy Mackal once suggested to submarine-inventor Dan Taylor – after the 1969 expedition which featured Taylor's one man sub – that they should go to the Comoros and dive for cœlacanths. They never did, but Dan Taylor is now building a larger submarine that steers and speeds along at 23mph (37km/h). During the summer of 1999, Taylor will dive again into Loch Ness to search for the lake's mystery inhabitants. With him, as the mission's official cryptozoologist, will be our 'On the Trail' columnist, Loren Coleman. Stay tuned for expedition updates in forthcoming columns.

Fortean Times
n° 117, December
1998, p. 46

24 September 1998

Nature 395, 335 (1998) © Macmillan Publishers Ltd.

Indonesian 'king of the sea' discovered

On 30 July 1998, an Indonesian population of coelacanth was discovered. It is apparently the same species as the well-known coelacanth from the Comoran archipelago in the Indian Ocean, Latimeria chalumnae Smith.

At sunrise on 30 July, Om Lameh Sonathan and his crew of ten fishermen retrieved a living coelacanth from their deep-set shark gill-net off the young volcanic island of Manado Tua, north Sulawesi, Indonesia. This is almost 10,000 km from the known population of L. chalumnae in the Comoros[1,2]. The Indonesian specimen, which is 124 cm long and weighs 29.2 kg, was observed live by one of us (M.V.E.) for more than 3 hours before the carcass was deep-frozen and tissue samples were collected for molecular analysis.

A preliminary examination of the specimen's external morphology suggests that it is conspecific with L. chalumnae, although this must be confirmed by further investigation.
The only immediately observable difference from published accounts of L. chalumnae is the colour. Previous specimens, from the western Indian Ocean, including the first one observed by Marjorie Courtenay Latimer, are usually described as 'steel blue'[3,4], although there are reports of dead coelacanths appearing brown[5]. The live Indonesian specimen was distinctly brown. It shares the same characteristic white mottling pattern as Indian Ocean specimens[6], but has numerous striking gold flecks over the entire dorsal surface of the body and fins. These are apparently a prismatic effect of light reflecting off the numerous denticles on the scales.

The fish was caught in a shark gill-net of mesh size 6 cm, approximately 150 m in length and 11 m in height, set 3.5 m off the substrate at a depth of 100-150 m for a 12-hour period overnight. The capture site was at the base of a steep volcanic slope known for its complex cave and crevice topography, and appears similar to the habitat reported for the Comoran coelacanths[7].

This is only the fourth coelacanth reported to be caught in a net, as the Comoran specimens were captured by fishermen hand-lining for the oilfish, Ruvettus pretiosus[4]. Of the three previous specimens caught outside the Comoros, two were captured in trawl nets, off South Africa[3] and Mozambique[7], and a specimen from Madagascar was caught in a gill-net[8]. Interviews with fishermen throughout north Sulawesi reveal that, although the oilfish is often caught by hand-line in this area, coelacanth (known locally as raja laut, or 'king of the sea') are only ever caught using deep gill-nets.

The new specimen is actually the second coelacanth to be reported from north Sulawesi. On 18 September 1997, the wife of M.V.E. saw a strange-looking fish being wheeled in a cart across the fish market in Manado. The fish was immediately recognized as a coelacanth, but we only managed to take some photographs of the fish and briefly interview the fisherman before it was sold. M.V.E. has since been interviewing fishermen in villages throughout the area, as part of a US National Science Foundation international postdoctoral fellowship with the Indonesian Institute of Sciences and with the support of the National Geographic Society. These surveys have identified several fishermen from north Sulawesi who claim to have captured coelacanths. These interviews, combined with the vast distance from the Comoran archipelago, strongly support the idea that the Indonesian coelacanths are part of an established north Sulawesi population, and not simply 'strays', as has been suggested for the other specimens captured outside the Comoros[9].
The discovery of an Indonesian coelacanth population has biogeographical and conservation implications. It is unlikely that living coelacanth exist only in two small, highly disjunct populations. Comparison of DNA sequences from tissues of the Indonesian and the western Indian Ocean specimens will reveal the depth of divergence between these two populations.

Further expeditions in Indonesia and to the islands in the vast stretch of Indian Ocean between the Comoros and Indonesia may discover additional populations. This would be welcome news for coelacanth conservation, as the fish

is considered highly endangered, in part because of its extremely limited distribution and small population size10. Nonetheless, the Indonesian government is already considering measures to prevent a repeat of the conservation problems caused by fishing and scientific collection in the Comoros11.

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†Indonesian Institute of Sciences, Jakarta, Indonesia

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RESEARCH NOTEBOOK

Health Letter Targets Youths

Plenty of research suggests young Americans are not well-informed about nutrition and don't eat as well as they should. A newsletter called "Kids for Healthy Hearts News," is written by youths 11 to 17, and is available free. A recent issue, printed in bright green and pink, is about complex carbohydrates. It has a recipe for honey raisin bran muffins, two puzzles, an essay on smoking and tips on eating. The newsletter is sponsored by Kellogg Co. Subscribe by writing to "Kids for Healthy Hearts, P.O. Box 3449, Battle Creek, Mich. 49016. — AP

Water Study Sites in Tampa, Oakland

Tampa, Fla., and Oakland, Calif., have been picked as tentative test sites for a study of how people use water in their homes and how much they could save if they installed high-tech plumbing devices. Researchers plan to attach monitors to toilets, shower heads and water meters at a sampling of homes in both cities.

"The information will enable us to project future demand and allow us to make realistic projections on how much water we can save through conservation," said Wendy Nero, conservation manager at the Tampa Water Department.

The Stevens Institute of Technology in Hoboken, N.J., will conduct the research, pending approval by the Tampa and Oakland city councils. If approved, the study should begin by January. Researchers also will study whether people using devices like low-flow shower heads really save water — or just take longer showers, said civil engineer Thomas Konen, the study's coordinator. — AP

Ants Protect Caterpillars

Science has detected the existence of a military treaty between the ant world and butterfly caterpillars. P.J. DeVries of the University of Texas at Austin says ants are providing protective escort for the highly vulnerable caterpillars. Wherever butterfly caterpillars go, they simply emit acoustic calls and ants come running. In return, the caterpillars provide food in the form of secretions that ants feed on.

— Copley News Service

Joggers Warned of Bad Air Traps

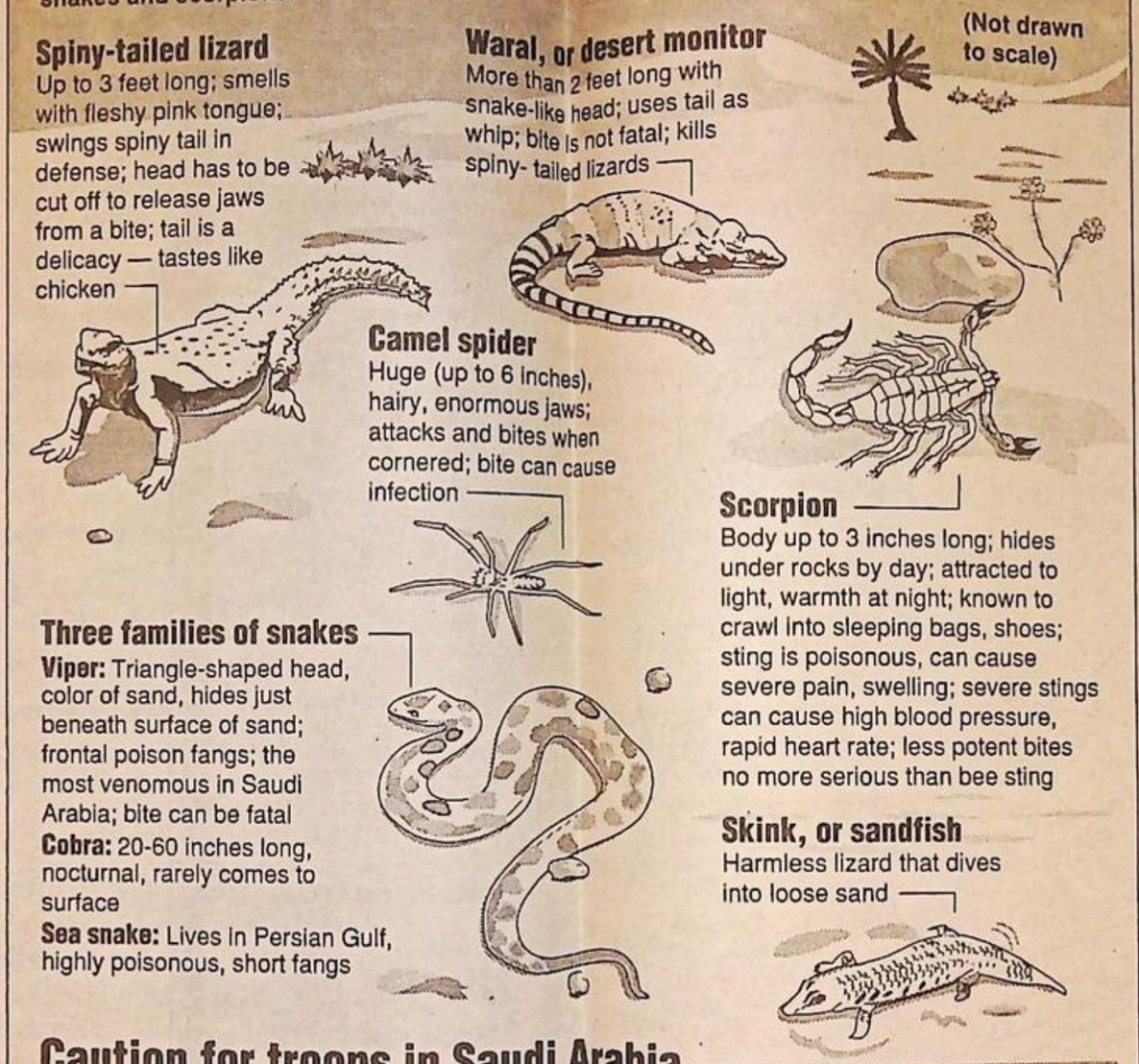
Exercising on tree-lined streets may be scenic, but University of Texas School of Public Health researchers say it could be dangerous.

The reason is large, overhanging trees can trap unsafe levels of traffic-spewed pollution, which is then inhaled by exercisers.

In tests along various streets in Houston, the researchers discovered that carbon-monoxide levels were highest along tree-lined thoroughfares.

Desert animals active round-the-clock

In the heat of the day in Saudi Arabia, grasshoppers, wasps, beetles and lizards are plentiful. Predators, such as snakes, camel spiders and rodents, come out at night. Some are dangerous when threatened. U.S. military based in Saudi Arabia are more concerned about snakes and scorpions.


Spiny-tailed lizard
Up to 3 feet long; smells with fleshy pink tongue; swings spiny tail in defense; head has to be cut off to release jaws from a bite; tail is a delicacy — tastes like chicken
Waral, or desert monitor
More than 2 feet long with snake-like head; uses tail as whip; bite is not fatal; kills spiny- tailed lizards
(Not drawn to scale)
Camel spider
Huge (up to 6 inches), hairy, enormous jaws; attacks and bites when cornered; bite can cause infection
Scorpion
Body up to 3 inches long; hides under rocks by day; attracted to light, warmth at night; known to crawl into sleeping bags, shoes; sting is poisonous, can cause severe pain, swelling; severe stings can cause high blood pressure, rapid heart rate; less potent bites no more serious than bee sting
Three families of snakes
Viper: Triangle-shaped head, color of sand, hides just beneath surface of sand; frontal poison fangs; the most venomous in Saudi Arabia; bite can be fatal
Cobra: 20-60 inches long, nocturnal, rarely comes to surface
Sea snake: Lives in Persian Gulf, highly poisonous, short fangs
Skink, or sandfish
Harmless lizard that dives into loose sand

Caution for troops in Saudi Arabia

U.S. medical experts stationed in Saudi Arabia say desert animals have not posed serious problems for troops, but medical facilities are well stocked with anti-venom medication. Also:

- Soldiers' thick leather boots good for stomping on scorpions; turn over rocks carefully with the foot first, not with the hand
- Bites require immediate medical care; doctors advise against attempting to suck out venom from a snake bite
- Viper bite riskiest for children, elderly, not fatal for healthy adults
- One U.S. soldier was bitten by a snake, but no poison entered his system

SOURCE: "Animal Life in Saudi Arabia," by Betty Lipscombe Vincett, U.S. Central Command; Research by WENDY GOVIER and LILY DOW

KRTN Infographics/REGINALD MYERS

frequent sips of liquids such as Gatorade, chicken broth, fruit juices or non-diet sodas — and try to drink 2 quarts a day — 3 quarts if you have a fever.

When diarrhea begins to subside, you can then eat easily digested foods such as bananas, cooked carrots, crackers or toast.

— Copley News Service

Broccoli Rich in Vitamin A

Broccoli may not have the typical yellow or orange hue, but it's rich in beta-carotene.

with it, dry air, dehydration, cramped quarters and flight preparation noises can trigger physical reactions that cause migraines.

The Diamond Headache Clinic in Chicago found that participants got relief by taking preflight doses of diazepam and a pain reliever to prevent headaches.

— Copley News Service

Electromagnetic Fields a Risk?

Are electromagnetic fields bad for your health? "Most experts we talk with private-

"If so, regulators and the public will be unwilling to wait for more research before calling for an immediate redesign of the electric system. Unless utilities, appliance manufacturers, and the building industry start doing careful engineering/economic homework now, a rush to manage the risks could result in inappropriate and inefficient actions."

— Scripps Howard News Service

Looking Toward Lunar Mining

Tomorrow's mines may be in outer space, reports the U.S. Bureau of Mines in its July Minerals Today. "Mining on the moon may very well become a reality early in the 21st century," writes William O. Stewart of the Bureau's Branch of Mining Technology. "The Bureau of Mines has been cooperating with (NASA) . . . for more than two decades to develop the technology for mining operations in other worlds . . . Such operations would probably focus on excavating the fine-grained lunar soil, using small digging and hauling equipment. Astro-miners would operate the equipment by remote control from protected structures on the moon."

— Scripps Howard News Service

'Dinosaur Fish' in Danger

A "dinosaur fish" that has survived into the 20th century could become extinct "within two decades," German scientists write in a letter to the British journal Nature. Until a half-century ago, scientists assumed coelacanths had gone extinct tens of millions of years ago. Then they discovered a live one in the West Indian Ocean. Now coelacanths' total numbers are down in the hundreds, "which is indeed a very small number," say Hans Fricke and Karen Hissmann. "Coelacanths are rare, and concentrated international efforts should be made to protect them."

— Scripps Howard News Service

Still No Cure for Jet Lag

Millions of air travelers suffer in varying degrees from jet lag, the body's inability to adjust quickly to sudden shifts in the timing of day and night. For years some experts have advised that before a trip, the traveler gradually shift his or her sleep schedule to that of the destination.

In recent years one well-publicized antidote is the "jet-lag diet" developed by Charles Ehret, a scientist with the U.S. Department of Energy's Argonne National Laboratory. The key is spending alternating days prior to departure emphasizing either protein in the diet or carbohydrates such as sugars and starches. Some destinations require downing a cup or two of strong black coffee on the evening of departure.

A U.S. Army research center in Natick, Mass., recently tested Ehret's jet lag diet on 23 soldiers, whose diets and sleeping schedules were manipulated for two weeks to simulate a flight from New York to Paris. The experiment did confirm jet lag's existence. But it failed to support the jet-lag diet. Those test subjects on the diet fared no better than the others. In some cases the required caffeine dose interfered with

Home

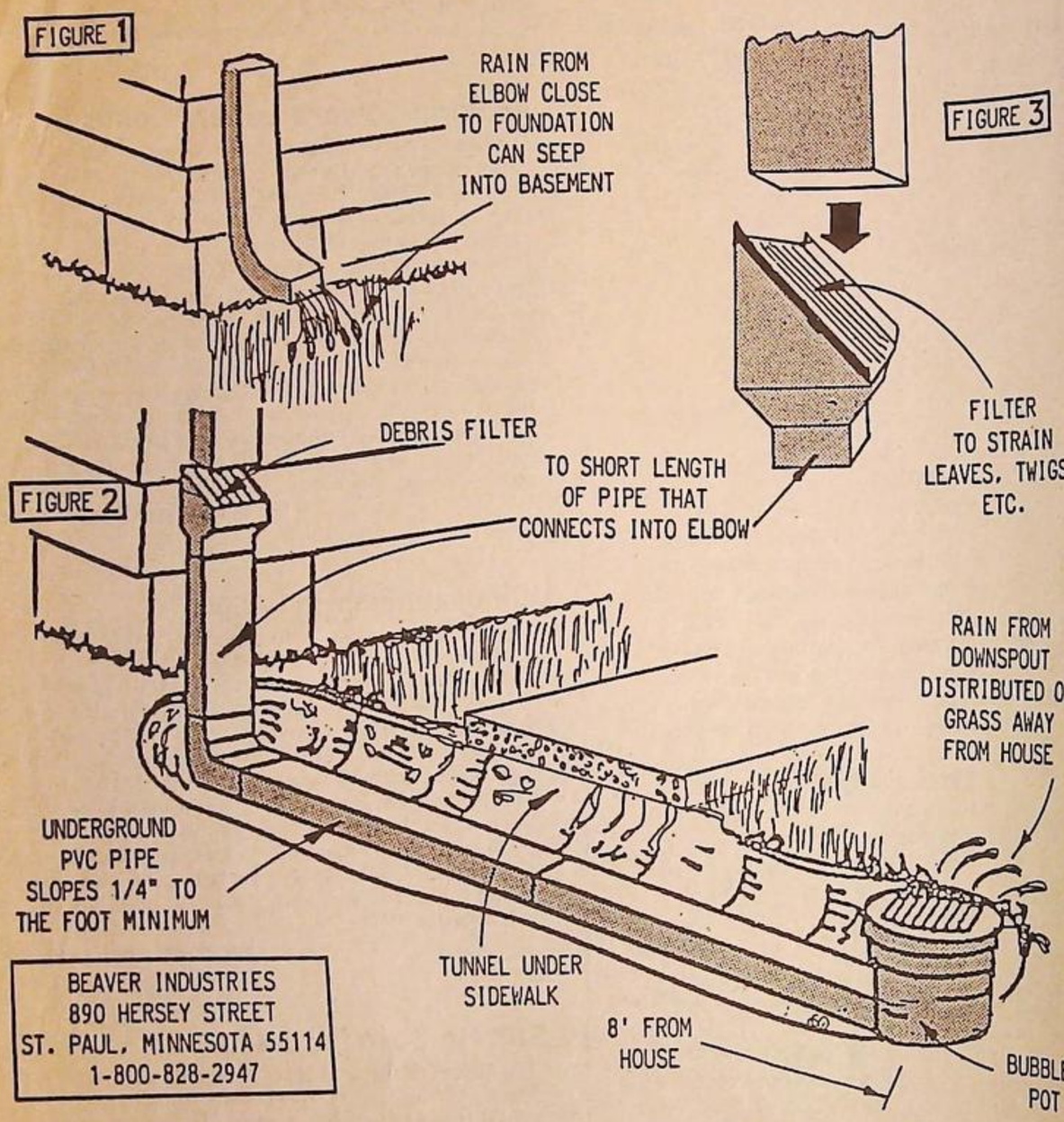


FIGURE 1
RAIN FROM ELBOW CLOSE TO FOUNDATION CAN SEEP INTO BASEMENT
FIGURE 3
FILTER TO STRAIN LEAVES, TWIGS, ETC.
DEBRIS FILTER
TO SHORT LENGTH OF PIPE THAT CONNECTS INTO ELBOW
FIGURE 2
RAIN FROM DOWNSPOUT DISTRIBUTED ON GRASS AWAY FROM HOUSE
UNDERGROUND PVC PIPE SLOPES 1/4" TO THE FOOT MINIMUM
TUNNEL UNDER SIDEWALK
8' FROM HOUSE
BUBBLER POT
BEAVER INDUSTRIES
890 HERSEY STREET
ST. PAUL, MINNESOTA 55114
1-800-828-2947

Keep Rain Away From Foundation

Basement Workshop

By Larry Eisenger

Building codes vary when it comes to how rainwater will be distributed; some permit the water to flow over the edge of the roof while others insist on gutters and downspouts leading to a drywell. This wasn't always the case; in many communities buildings often connected a downspout (called a leader) into the sewer system — this is now

aluminum (although we do have extruded PVC downspouts that look like aluminum), slip a fitting in place, and continue running the line in a trench away from the house and into the

downspout may solve your problem. Incidentally, the bubbler pot cover is large enough so if any debris finds its way past the filter, merely lift off the lid and clean it out. And, lest you think

Avoid Fire: Watch Outlets, Cords

Scripps Howard News Service

Oscillating fans create a cooling breeze, providing comfort on a hot summer evening; automatic coffeemakers begin brewing the morning's first cup even before we're fully awake, and videocassette recorders let us view television programs and movies at our convenience.

But just as the use of appliances can enhance life, their misuse and a resulting fire can end life.

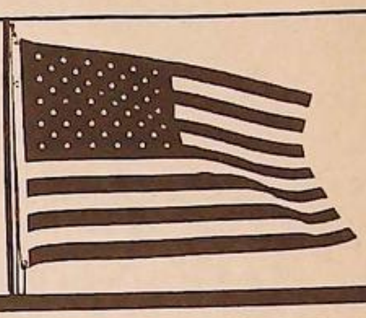
According to public safety officials, fire can result from a relatively simple thing, like doubling up appliances on a single electrical outlet or stringing out an energy-gobbling appliance on a frayed or substandard extension cord.

"People just don't believe us when we say extension cords cause fires," says Roy Del Carlo, fire marshal at the Redding, Calif., Fire Department.

Del Carlo says one of the most common household hazards is simply trying to plug too many things into a single outlet or substituting an extension cord for permanent wiring.

While the various appliances may operate without any apparent problem, an extension cord may overheat, especially if it is called upon to deliver power to more than one appliance.

SHOW YOUR...



PATRIOTISM

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ROTARY PHONES GO TO OPERATOR

RECORDED

Replace Essential Fluids for Diarrhea

Diarrhea remedies: For most effective relief, it's essential to replace lost fluids and electrolytes. So, even if you feel nauseous or are vomiting, researchers suggest you take

Stress Gives Flyers Migraines

Stress causes some travelers to get migraine headaches while flying — not changes in altitude and barometric pressure. Besides the anxiety of flying, and the hassles and rushing that come

The best advice for bicyclists, runners and other exercisers is to work out in windy, wide-open spaces — or, at least, exercise on tree-lined streets in the evening, when there is less traffic and the wind is more gusty.

—Copley News Service

Registered dietitian Karen Owens says although broccoli florets have eight times as much beta-carotene as the stalks, one stalk provides half the RDA for vitamin A. It's also rich in vitamin C, several B vitamins, iron, fiber and calcium.

— Copley News Service

by five odds between 10 and 60 percent that within the next decade it will become clear that exposure to fields produces significant health risks," says the August issue of IEEE Spectrum, a journal published by the Institute of Electrical and Electronics Engineers.

— Scripps Howard News Service

their sleep patterns, the researchers reported.

"The only sure-fire way to overcome jet lag remains the tried and true way," suggests the Tufts University Diet and Nutrition Letter: "tough it out."

Auf Spurensuche

FRICKE (Hans):

Quastie im Baskenland?

Moderne Nachbildung oder heiße Spur für Quastenflosser im Atlantik? Das ist die Frage, der Hans Fricke seit geraumer Zeit nachgeht.

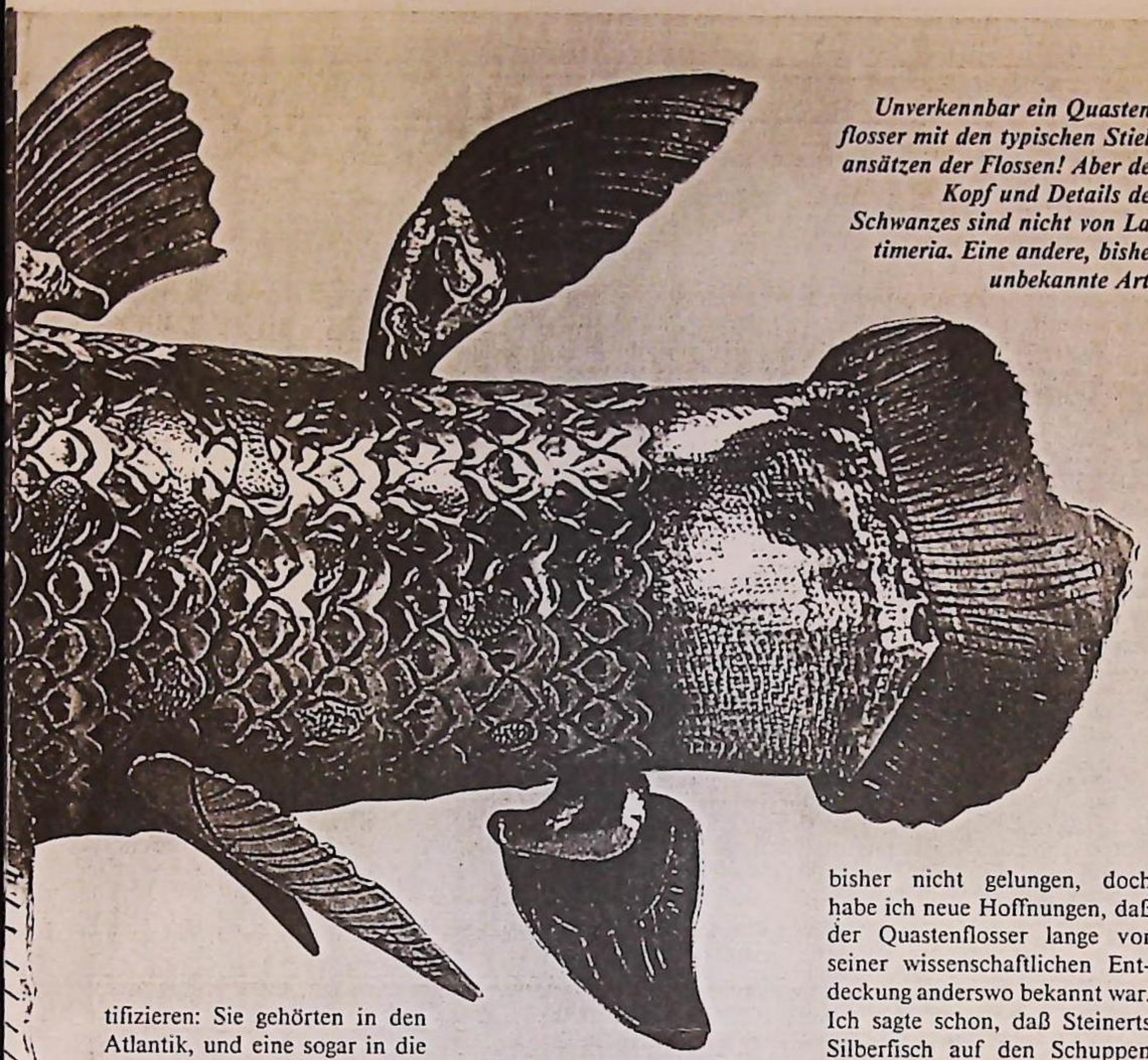
(Tauchen, Nr. 10, Oktober 1989, ff. 64-67)

Fachleute wußten es alle: In der Nähe von Bilbao im Baskenland war 1964 in einer Kirche ein Silberquastenflosser entdeckt worden. Er hing als sogenanntes Exvoto, eine Votivgabe also, von der Decke einer kleinen Kapelle, und dort wurde er von Dr. Reti aus Rio de Janeiro zufällig fotografiert. Das Bild erschien in der amerikanischen Zeitschrift „Sea Frontier" und löste heftige Spekulationen aus. War der Quastenflosser Latimeria lange vor seiner wissenschaftlichen Entdeckung 1938 bekannt? War vielleicht sogar eine Latimeria nach Spanien verdriftet worden? Oder hatte ein Seemann dem Silberschmied eine „eingemachte" Latimeria als Vorbild gegeben? Gab es gar Quastenflosser vor Spaniens Küsten? So etwas wäre mir am liebsten gewesen, beschäftigten mich doch Quastenflosser seit meiner Jugendzeit, seit der Südafrikaner J.L.B. Smith diesen altertümlichen Fisch gefunden und in einem liebenswürdigen, aber sehr rassistischen Buch „Old Fourlegs" für uns alle verewigt hat.

Der Quastenflosseralarm in Spanien blieb nicht der einzige. Professor Anthony aus Paris, ebenfalls ein Quastenflosser-Forscher, beschrieb 1972 einen weiteren Fund, aufgetaucht in einem Antiquitätengeschäft in Toledo. Dort war er 1965 gekauft worden. Sein Besitzer, Maurice Steinert aus Brüssel, Molekularbiologe an der dortigen Freien Universität, hatte ihn als Student für nur 9500 Pesetas erstanden. Er erhielt auch ein Zertifikat, das die Herkunft des Fisches aus dem 19. Jahrhundert bestätigte. Steinert erkannte sofort, daß es sich um einen Quastenflosser handelte, hatte er doch die typischen Flossenstiele. Lange blieb es dann still um diesen prächtigen Silberfisch.

Im Juli 1987 – wir hatten gerade den Quastenflosser im Indischen Ozean mit unserem Tauchboot GEO aufgespürt – flog ich nach Brüssel: Ich wollte den Silberquastenflosser mit eigenen Augen sehen. Da hatte ich ihn endlich in den Händen: Komplizierte Gelenke bewegten den Körper. Sein Kopf ließ sich über ein Gelenk nach unten klappen, und auf diese Weise konnte ein Brief oder eine andere Dankesgabe im Bauch des Fisches verschwinden. Ich entdeckte aber noch mehr. Die Schuppen waren besonders fein graviert und zeigten Muster, die sich als Zeichnungsflecken wie bei der Latimeria entpuppten. Flossen und Flossenansätze glichen in der Tat denen des berühmten „lebenden Fossils". Aber der Kopf war kein Latimeriakopf. Wie auch die Schwanzflosse die typische kleine Extraflosse der Latimeria nur andeutungsweise enthielt.

Der Silberfisch war ein Quastenflosser, aber nicht unbedingt eine Latimeria! Vielleicht also doch eine andere, noch unbekannte Art? Mein Verdacht erhielt beim Mittagessen in Steinerts Haus unerwartet schnell neue Nahrung. Fast nebensächlich erwähnte Maurice, daß er noch andere Silberfische in dem Antiquitätengeschäft in Toledo gesehen und Fotos davon gemacht habe. Mir schlug das Herz bis zum Hals, als ich die Bilder in den Händen hielt. Die Fische waren so präzise gearbeitet, daß nicht nur Ähnlichkeiten in der handwerklichen Arbeit zu dem Silberquastenflosser offensichtlich wurden, sondern auch die Arten ließen sich leicht iden-



Unverkennbar ein Quastenflosser mit den typischen Stielansätzen der Flossen! Aber der Kopf und Details des Schwanzes sind nicht von Latimeria. Eine andere, bisher unbekannte Art?

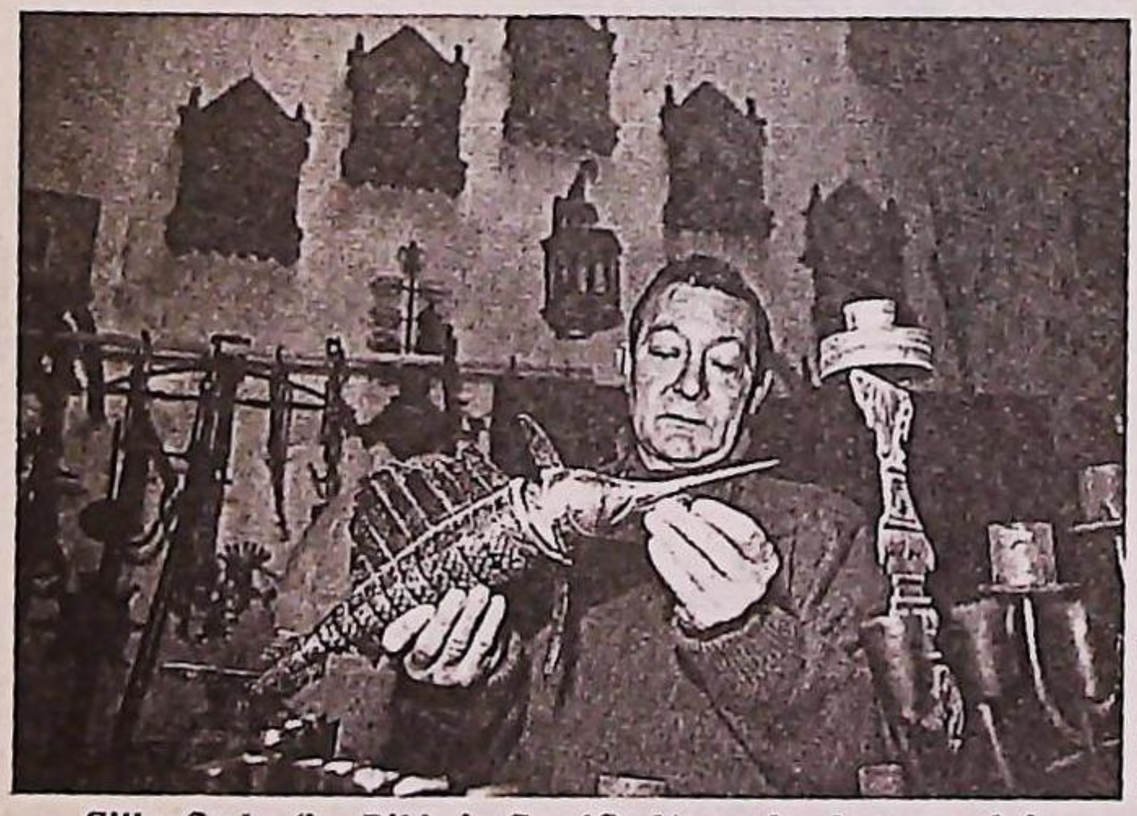
tifizieren: Sie gehörten in den Atlantik, und eine sogar in die Gewässer des Amazonas. War dies ein indirekter Hinweis für einen atlantischen Quastenflosser?

Im Überschwang meiner eigenen Einbildung wälzte ich viele Hypothesen. Aber je mehr Zeit verstrich, desto mehr zehrte fast masochistischer Zweifel an der Festigkeit meiner gedanklichen Gebäude. Ich kam auf den Boden der Realität zurück, und die sah etwa so aus: Ein Silberschmied in Spanien könnte vielleicht Fotos der Latimeria in den Händen gehabt haben. Die Arbeit stammte folglich also nicht aus dem 19. Jahrhundert, sondern wäre modernes 20. Jahrhundert. Dies wäre also der „schlimmste" Fall, den man detektivisch widerlegen müßte!

Ganz zweifelsfrei ist mir das bisher nicht gelungen, doch habe ich neue Hoffnungen, daß der Quastenflosser lange vor seiner wissenschaftlichen Entdeckung anderswo bekannt war. Ich sagte schon, daß Steinerts Silberfisch auf den Schuppen angedeutete Fleckenmuster hatte. Solche Muster trug der erste gefangene Quastenflosser aus dem Jahr 1938 nicht. Erst 1954 erschien in einer französischen Fachzeitschrift ein Foto von Latimeria, das eindeutig diese Fleckenmuster aufwies. Der Silberschmied könnte also seinen Fisch nur nach 1954 modelliert, und er müßte dazu diese wissenschaftliche Arbeit gesehen haben. Zwischen Herstellung und Kauf durch Maurice Steinert könnten also nur 11 Jahre vergangen sein. Silberkunstexperten kamen unabhängig voneinander nach unseren Fotos zu der Überzeugung, daß die Art der Silberarbeit auf das 17. bis 18. Jahrhundert hinweise. Festlegen könnten sie sich jedoch nicht, dazu müßten sie das Original in den Händen halten. Auch das Gelenk unterhalb des Kopfes könnte handwerkliche Arbeit aus dem 18. Jahrundert sein.

Ein Leser unseres GEO-Berichts schrieb mir, daß er einen Quastenflosser auf dem Fischmarkt von Palma auf Mallorca gesehen habe. Als ich nachfragte, ob ein Foto existiere, kam die überraschende Antwort, daß er den Fisch nicht fotografierte, weil er ja bereits bekannt sei. Ein Fischer aus Griechenland behauptete sogar, gelegentlich etwa 50 Zentimeter lange Exemplare in der Ägäis zu fangen. Schließlich kam Quastenflosseralarm auch aus Vigo in Westspanien an der Atlantikküste. Dort sei ein Quastenflosser auf einem Fischmarkt aufgetaucht. Ein Foto zeigte aber nur die unscharfen Umrisse eines Anglerfisches. Seitdem traue ich auch Fischkennern nicht mehr so ganz über den Weg . . .

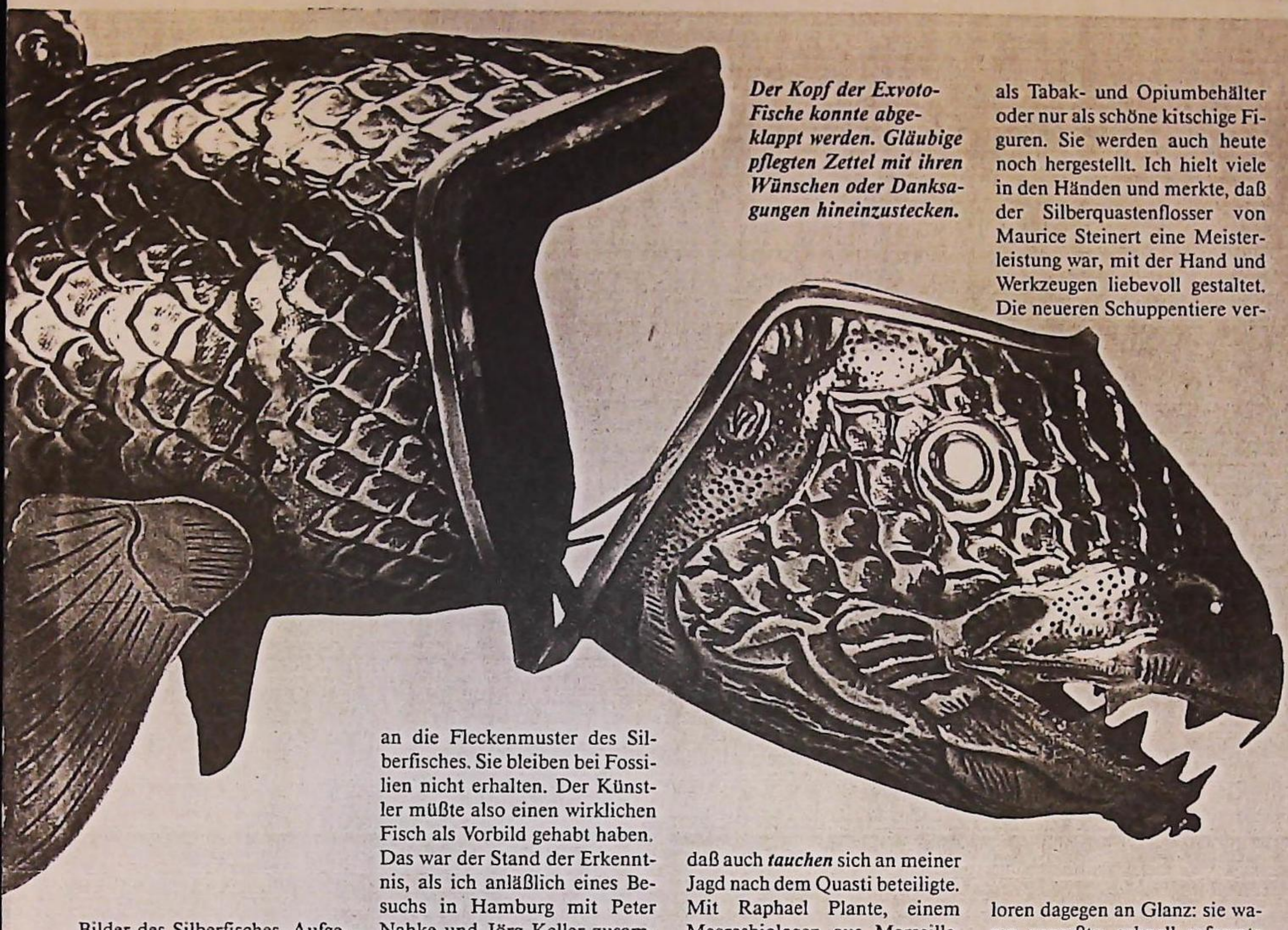
Allerdings – so muß ich gestehen – überraschte mich die Aussage eines Wissenschaftlers auf einem Kongreß für Fossilforscher in Kanada. Dort war ich zu einem Vortrag über Latimeria eingeladen und zeigte auch



Silberfische (im Bild ein Segelfisch) werden heute noch in Spanien als Touristenandenken angeboten . . .

. . . aber dabei handelt es sich um teilweise maschinell hergestellte, längst nicht so sauber gearbeitete Massenware. ▷

Alle Fotos: Hans Fricke



Der Kopf der Exvoto-Fische konnte abgeklappt werden. Gläubige pflegten Zettel mit ihren Wünschen oder Danksagungen hineinzustecken.

Bilder des Silberfisches. Aufgeregt kam danach ein junger Kanadier zu mir, der gerade seine Dissertation über die Evolution von Quastenflossern geschrieben hatte. Es bestünde kein Zweifel für ihn, so behauptete er nach erneutem Blick auf die Fotos, daß dies nicht Latimeria, sondern eine bekannte fossile Gattung sei. Sofort dachte ich an die Fleckenmuster des Silberfisches. Sie bleiben bei Fossilien nicht erhalten. Der Künstler müßte also einen wirklichen Fisch als Vorbild gehabt haben. Das war der Stand der Erkenntnis, als ich anläßlich eines Besuchs in Hamburg mit Peter Nahke und Jörg Keller zusammensaß. „Nach Nordspanien müßte ich reisen können, dort selbst die Kirchen und Museen abklappern." Aber vor solche Vorhaben setzen die Götter wie immer die Finanzierung. „Laß uns das übernehmen", meinte Jörg, „mein Verleger hat ein Faible für solche Abenteuer. Das Geld eise ich los!" So kam es, daß auch ***tauchen*** sich an meiner Jagd nach dem Quasti beteiligte. Mit Raphael Plante, einem Meeresbiologen aus Marseille, fuhr ich nach Spanien und ging erneut auf die Suche nach den Silberfischen. Wir durchstöberten Kirchen, Kapellen und 21 Antiquitätengeschäfte und merkten, daß die Kirchen leer und der Silberquastenflosser in Fachgeschäften unbekannt war. Und doch fanden wir Silberfische: als Gewürzdosen, als Tabak- und Opiumbehälter oder nur als schöne kitschige Figuren. Sie werden auch heute noch hergestellt. Ich hielt viele in den Händen und merkte, daß der Silberquastenflosser von Maurice Steinert eine Meisterleistung war, mit der Hand und Werkzeugen liebevoll gestaltet. Die neueren Schuppentiere verloren dagegen an Glanz: sie waren gepreßte, schnell geformte Massenware.

Wir durchquerten auch das Baskenland, sprachen mit Priestern und kirchlichen Würdenträgern, suchten in Kirchenschätzen und Dioziösenmuseen nach weiteren Anhaltspunkten. Auch in Biarritz, gab es eine Spur. Dort lebte der spanische Baron de Baena et San Lucar mit einer

Exvoto-Figuren hingen früher – so wie heute noch dieses Segelschiff – in vielen spanischen Kirchen von der Decke.

Detail der Latimeria, die Fricke auf 200 Meter Tiefe fotografierte. Man beachte den Auswuchs am Schwanz.

Kenya's first coelacanth

DISCOVERY

The 'living fossil' captured earlier this year off Malindi on the Kenya coast greatly extends the known range of this most unusual and special of fishes. ***Gordon Boy*** *reports.*

An extremely rare and unusual marine fish species has, for the first time, been found to occur off the Kenyan coast. The fish in question is a coelacanth, the living embodiment of a lineage of fishes that has endured, virtually unchanged, for hundreds of millions of years, surviving even the mass extinction of the dinosaurs roughly 80-million years ago.

One of these prehistoric fishes was captured earlier this year in the nets of a commercial fishing trawler operating off the Kenyan coastal resort town of Malindi. The trawler, the *MV Venture II*, owned by Alessandro Basta, with its captain, Ebrahim Fahli, and his 28-strong crew, was some nautical miles from shore when the fish was captured – at a depth of 185 metres.

No coelacanth (pronounced *see-La-kanth*) had ever before been recorded in East African waters.

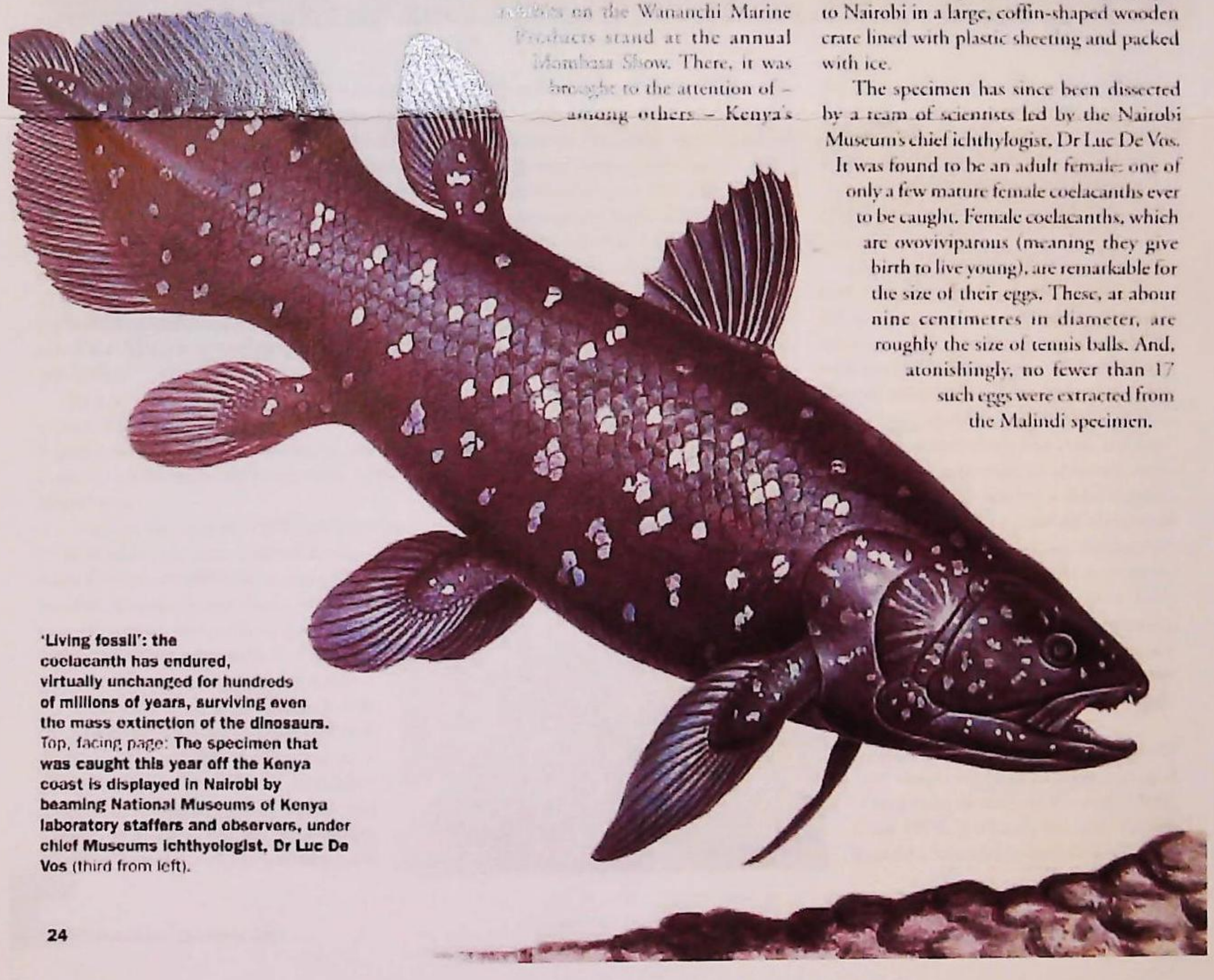
The dead coelacanth, 1.7 metres long and weighing 77 kilogrammes, was in September handed over to the Department of Ichthyology at the National Museums of Kenya (NMK) in Nairobi. For nearly four months prior to this, it had been kept frozen – and in virtual obscurity – in the cold storage depot of the Mombasa-based fishery company, Wananchi Marine Products Limited, to where the trawler had been making when the fish was netted – at noon on Sunday 26 April.

The bizarre-looking catch escaped wider public notice until late August, when – at the suggestion of Kenya Fisheries' Coast Assistant Director (Coast), Charles Okinyi – it was placed among the exhibits on the Wananchi Marine Products stand at the annual Mombasa Show. There, it was brought to the attention of – among others – Kenya's President Daniel arap Moi, who was touring the showgrounds after officiating at the event's opening ceremony.

The Kenyan President duly issued a directive to the effect that this fish was a natural asset to the country and should be preserved. So the specimen's existence was reported to Mombasa's Fort Jesus Museum. That museum, in consultation with the Kenya Fisheries' Department, contacted Dalmas Oyugi, a research scientist with the NMK Ichthyology Department in Nairobi, as Fort Jesus does not house natural history collections.

Oyugi then arranged for an NMK vehicle to take him and two of his Departmental colleagues, Michael Mburu and Joseph Gathua, down to Mombasa to collect the specimen. The trio took delivery of the coelacanth on September 12, transporting it to Nairobi in a large, coffin-shaped wooden crate lined with plastic sheeting and packed with ice.

The specimen has since been dissected by a team of scientists led by the Nairobi Museum's chief ichthyologist, Dr Luc De Vos. It was found to be an adult female: one of only a few mature female coelacanths ever to be caught. Female coelacanths, which are ovoviviparous (meaning they give birth to live young), are remarkable for the size of their eggs. These, at about nine centimetres in diameter, are roughly the size of tennis balls. And, astonishingly, no fewer than 17 such eggs were extracted from the Malindi specimen.



'Living fossil': the coelacanth has endured, virtually unchanged for hundreds of millions of years, surviving even the mass extinction of the dinosaurs. Top, facing page: **The specimen that was caught this year off the Kenya coast is displayed in Nairobi by beaming National Museums of Kenya laboratory staffers and observers, under chief Museums ichthyologist, Dr Luc De Vos** (third from left).

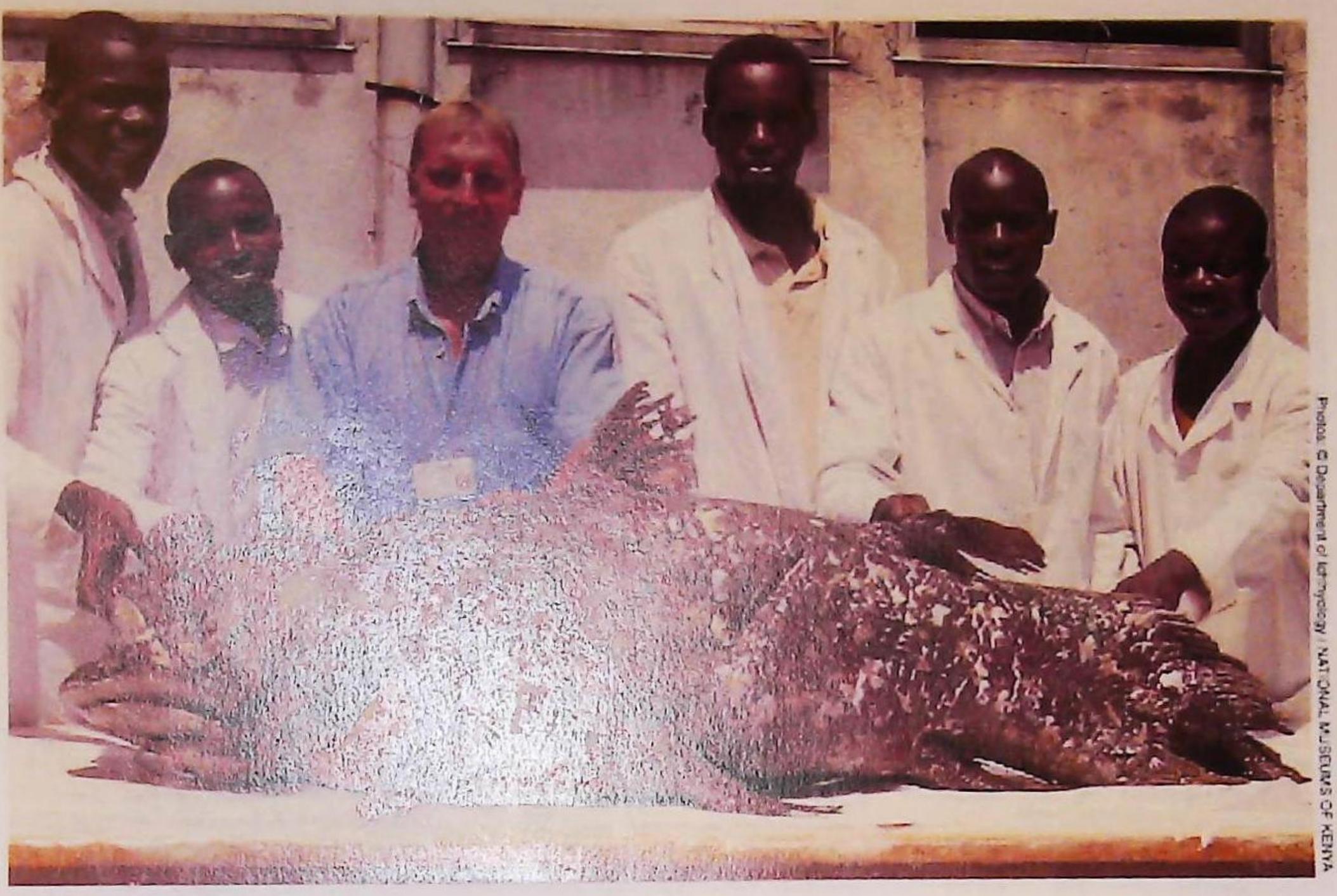


Photo: © Department of Ichthyology / NATIONAL MUSEUMS OF KENYA

Tissue samples taken from the fish are now undergoing DNA tests, to determine whether this fish is related genetically to the coelacanths that occur around the Comoros Islands, near Madagascar off the southern African coast. "The DNA sequences will tell us," says De Vos, "whether this fish was simply a stray from the south, as we suspect; or whether there could be a more localised coelacanth population distributed between the East African coastline and, say, the Seychelles."

The answer to this intriguing question is expected fairly soon, he says. Either way, the Kenyan find effectively extends the known range of coelacanths by more than 1,000 kilometres.

Until as recently as 1938, coelacanths were known only from ancient fossils – some dating back 400-million years. Their sudden disappearance from the fossil record about 80-million years ago suggested that coelacanths had become extinct at the same time as the dinosaurs.

The first living coelacanth was discovered off the eastern coast of South Africa, at the mouth of the Chalumna River near East London, in December 1938. That original type specimen was caught in a shark gill net by Captain Hendrik Goosen and his trawling crew at a depth of 40 fathoms (nearly 75 metres). Neither Goosen, nor his crew, had any idea at the time of the immense significance of the "strange one" among their catch.

Fortunately, however, the odd-looking specimen was noticed by the then inquisitive young curator of the East London Museum, Marjorie Courtenay-Latimer, who was in the habit of sifting through the assorted hauls – of sharks and other fishes – brought in by Goosen's trawler, the *Nerine*. On having the fish carried by taxi to her museum, Courtenay-Latimer alerted South Africa's leading fish biologist, Prof James L B Smith, then based at Rhodes University in Grahamstown.

Smith went on to describe the fish – which he named *Latimeria chalumnae*, after the young East London curator and the river mouth of origin, respectively – and to introduce the coelacanth to an astonished wider world. Indeed, the coelacanth's discovery is still widely considered to be one of the most amazing zoological finds of the twentieth century.

Described as 'living fossils,' coelacanths have changed little anatomically over the past 400-million years. As such, they may provide scientists with answers to some intriguing evolutionary questions. They differ markedly from all other living fishes in having fleshy appendages, or lobes, at the bases of their paired fins, which move like arms and legs.

The coelacanth takes its common name from the Greek for 'having a hollow spine', a reference to its incompletely developed vertebral column. Coelacanths also have distinctive three-lobed tails, and are the only living creatures with a fully functional intracranial joint separating the ear and brain from the nasal organs and eyes, allowing the front part of the head to be lifted while the fish, which is a predator, is feeding.

Single coelacanths have occasionally been caught off both Mozambique and Madagascar, as well as off South Africa. Until 1998, however, the only known sizeable coelacanth population was that

occurring around the remote Comoros Islands, where typically they inhabit rocky reefs at depths of between 150 metres and 600 metres.

Coelacanths are usually steely blue in colour, but are flecked with white body markings from which individual fish can be identified and monitored. Adult coelacanths measuring two metres from head to tail and weighing as much as 98 kilogrammes have been recorded.

In July 1998, a second coelacanth population was discovered off the island of Manado Tua, near Sulawesi in eastern Indonesia, some 10,000 kilometres east of the Comoros archipelago. After a lengthy dispute among scientists, this second population was declared to be a separate species and was given the scientific name *Latimeria menadoensis*. The coelacanth turns out, not surprisingly, to have been familiar to generations of Sulawesi fishermen, who call it simply *raja laut*, or 'king of the sea.'

The coelacanth's 80-million-year absence from the fossil record has been ascribed to changes in the fish's habitat. Prehistoric coelacanths, at their most abundant 240-million years ago, were evidently much more widespread and appear to have lived in environments conducive to fossilisation.

Modern coelacanths, by contrast, are found predominantly in, and around, deep-lying caves and rocky overhangs in vertical marine reefs skirting relatively newly formed volcanic islands, which are comparatively poor environments for fossilisation.

Further information on Kenya's first coelacanth can be obtained from Dr Luc de Vos at the National Museums of Kenya Ichthyology Department, e-mail: < nmk@museums.or.ke >.

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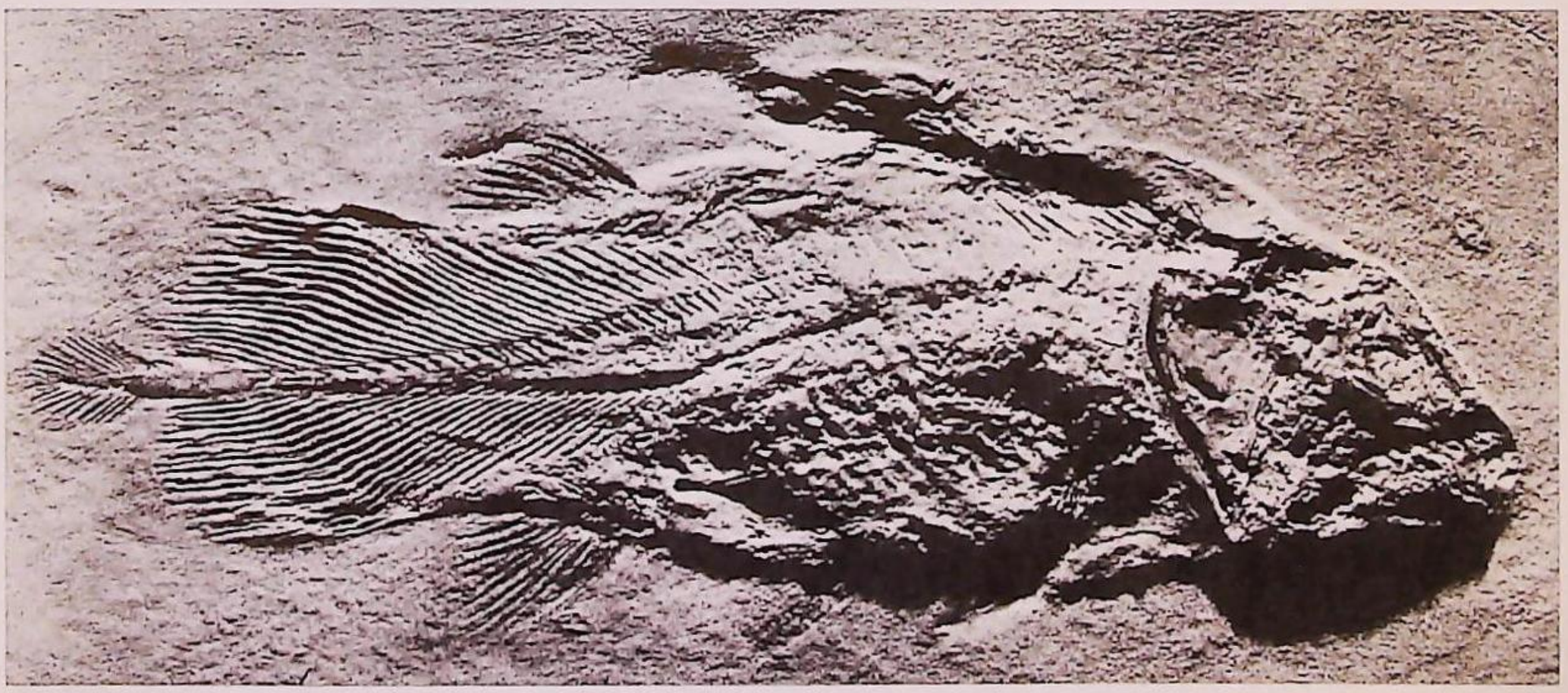
On the slab: Kenyan's coelacanth (top right), one of remarkably few adult females ever caught, was found to be carrying no fewer than 17 well-developed, tennis-ball-sized eggs. Below: **Coelacanth fossil dating from 200-million years ago, shows how little this 'dinosaur' fish species has changed over the ages.**

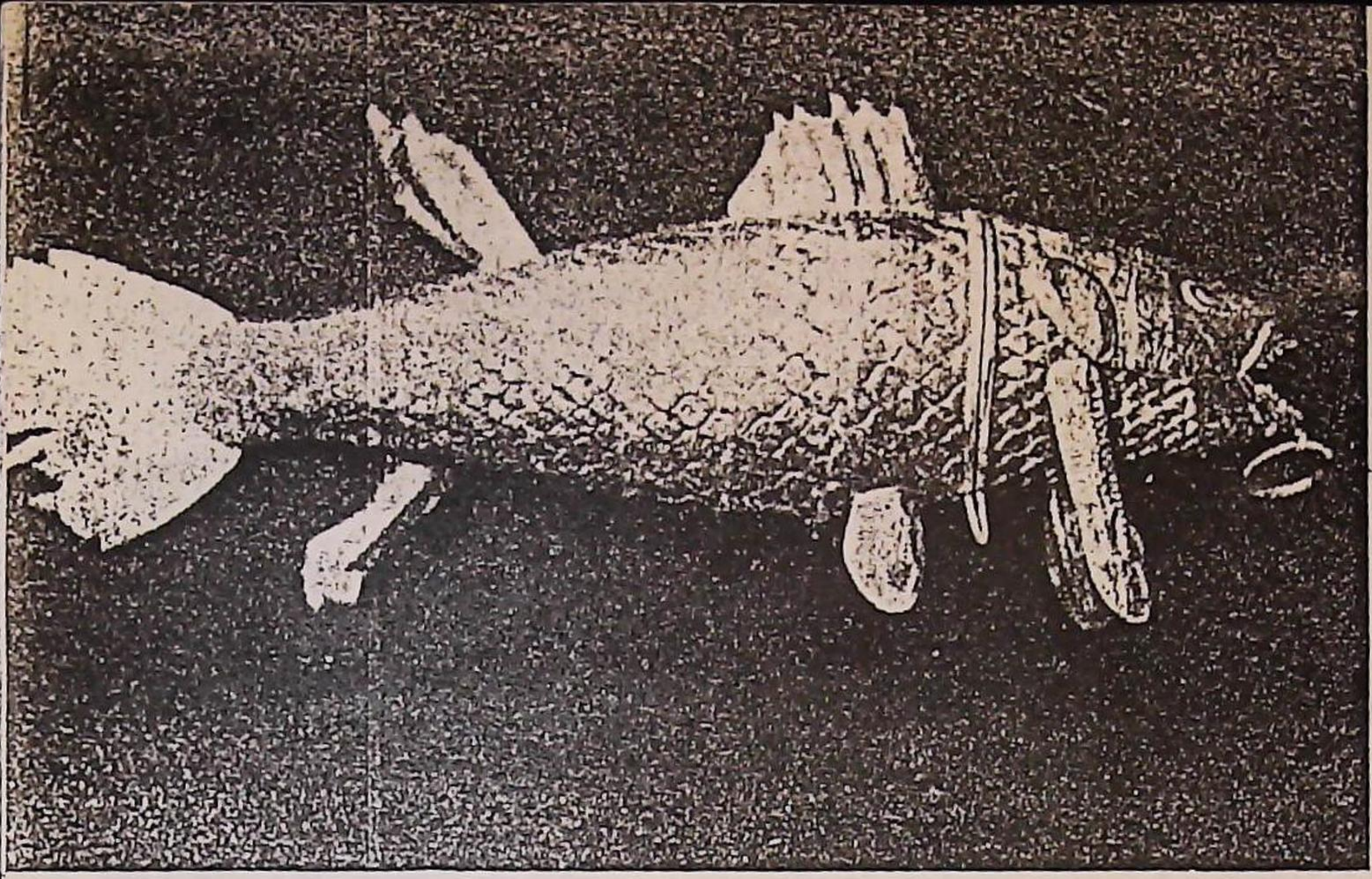
Even so, the Kenyan discovery may indicate that coelacanths are still more widely distributed today than has previously been supposed.

If the experience of other museums around the world is anything to go by, then Kenya's very own coelacanth, properly mounted and displayed, could become a major attraction for tourists, school parties and members of the public alike. For coelacanths are so very seldom captured that only a few museums around the world can boast of having one among their permanent exhibits.

The National Museums of Kenya (NMK) is therefore anxious, as soon as possible, to be able to put the Kenyan coelacanth – or at least a good casting of it (since the actual fish is rather badly damaged) – on public display in one of its main exhibition halls in Nairobi.

A special display case for the fish – lit up by spotlights and flanked by illustrated supplementary information panels and other educational aids and materials – is envisaged, along with additional castings for display at Fort Jesus in Mombasa and possibly at other educational establishments in Kenya.





Mystery of the Silver Coelacanth

By DONALD P. DE SYLVA

IN 1938, ONE OF the greatest scientific discoveries of the twentieth century was made off East London, South Africa. A fishing trawler brought up from a depth of about 360 feet a 5-foot, 127-pound fish which was unlike any the skipper had ever seen. It was a vicious-looking animal, with a set of strong teeth, and the fins were set on stalks. The skipper saved the catch, and, through the efforts of Miss Courtenay-Latimer, the fish was brought to the attention of Professor J. L. B. Smith of Rhodes University, Grahamstown, South Africa. He recognized this fish as more than unusual—it was a living example of a fish supposedly extinct for at least 60 million years. This strange fish, a representative of a group of fishes known from fossils dating back 350 million years, belonged to the lobe-fins, family Coelacanthidae. Professor Smith named it *Latimeria chalumnae,* and subsequently offered rewards to any fishermen who could

obtain additional specimens. Fourteen years later, a second one was obtained in the Comoro Islands, near Madagascar, and given to Professor Smith. To date, nearly thirty have been taken off the east coast of Africa and made available to science.

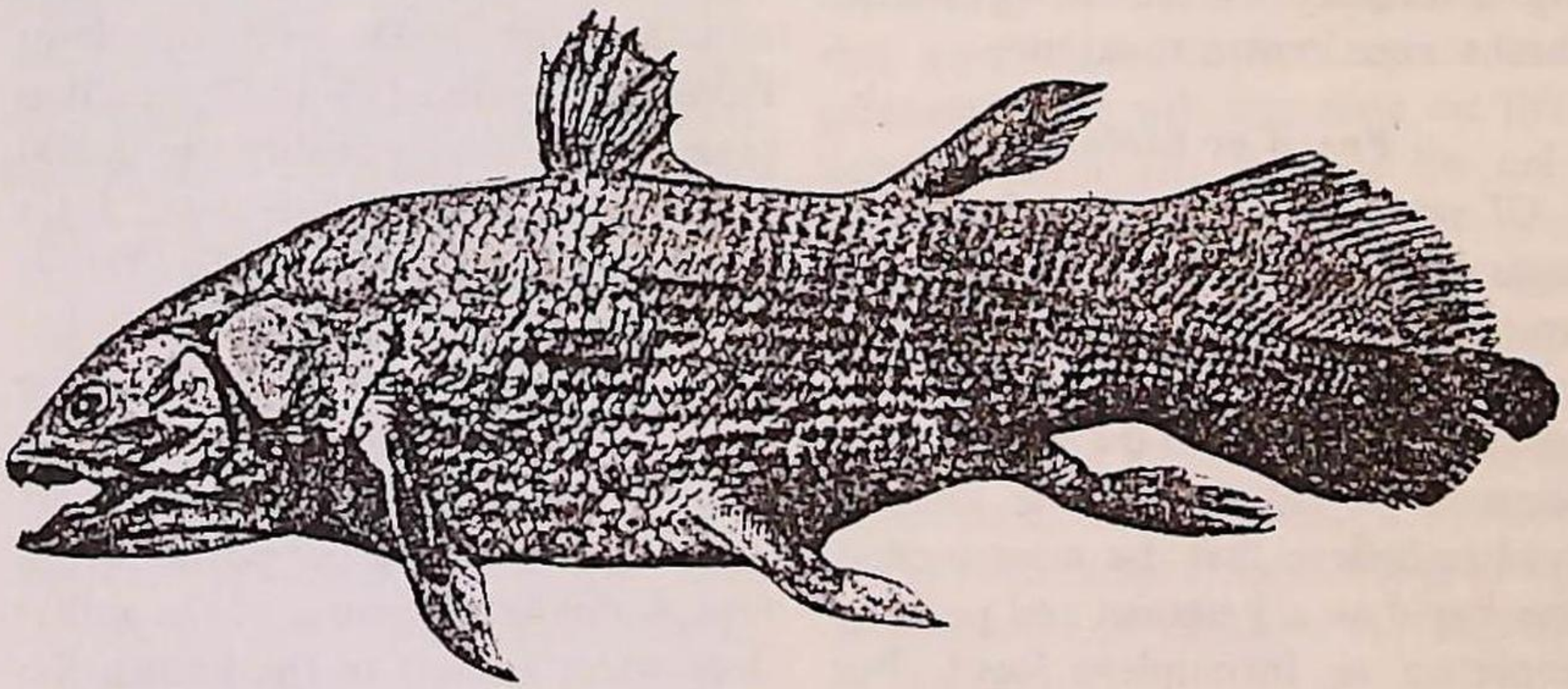
Queer Fish

Subsequent study of these specimens showed them to be unique in their possession of a large lung, a peculiar heart, an intestine which resembled that of a shark, an unusually formed pituitary gland of the brain, hollow fin-spines, and a backbone which is essentially a tube of cartilage. The coelacanths are related to fish families which are believed to have given rise to the first animals which became adapted for living on land. Here, then, was a truly great find and a chance for science to piece together possible "missing links" in the evolution of life. (*Sea Frontiers*, Volume 11, Number 3, May-June, 1965, "Living Fossils of the Deep Sea.") It was subsequently learned that the natives of the Comoro Islands had known about this fish, which they call "kombessa," for many years. In fact they salted and dried it for food and used the rough scales to repair bicycle tires!

Living coelacanths are known only from the waters off the east coast of Africa, but some fossil genera dating from the Carboniferous (about 229 to 350 million years ago) or Permian

LEFT: STRANGE ORNAMENT, *4 inches long, made of silver was found in Spain in 1964. It bears a striking resemblance to a coelacanth. The puzzling circumstance is that it is believed to have been made about a century before living coelacanths were known to science. (Pablo P. Bardin)*

BELOW: FIRST LIVING COELACANTH *known to science was caught in 1938 off East London, South Africa. Before this the fish was believed to have been extinct for at least 60 million years. (J. L. B. Smith)*



(192 to 275 million years ago) are known from England, Scotland, Europe, and North America, while other genera occur in the Carboniferous of North America and the Cretaceous (from 90 to 100 million years) strata of England and Europe. While some fossil coelacanths are in relatively good condition, many are known only from bits and fragments.

Mediterranean Mystery

But a new chapter began when IOF member Dr. Pablo P. Bardin, of Buenos Aires, Argentina, recently sent to the Foundation a photograph of a four-inch silver model of a coelacanth. The accurately-scaled reproduction was purchased in Spain in the summer of 1964 by Dr. Ladislao Reti, a chemist. Dr. Reti obtained the objet d'art from a priest who had the beautiful artifact hanging as an ex-voto in a village church near Bilbao, on the Atlantic northern coast of Spain. While the species depicted is apparently not *Latimeria*, it is certainly a closely related species of coelacanth. Dr. Reti believes that this fish was made by a silversmith possibly a century before living coelacanths were known to science.

Fossil or Living?

Of two possible explanations, the more likely one is that the artist worked from a fossil coelacanth found perhaps in one of the Mediterranean countries. But the replica is so accurate in detail that one finds it hard to believe that the reproduction was based on a flattened and possibly imperfect or incomplete fossil. For even the best of artisans to achieve such lifelike perfection from a fossil seems incredible.

The other possibility, while remote, is quite intriguing. Could there be living coelacanths somewhere else besides off east Africa? The habitat of the coelacanths that have been taken is very steep and rocky. They have been caught in cool water, and all but the first specimen came from depths of between 650 and 2000 feet. Such habitats are not uncommon in the Mediterranean and eastern Atlantic Ocean, especially about the Canary Islands and the Azores. In many cases of exploratory fishing, it has been shown that the failure to catch a certain species of fish is often due to the lack of appropriate tackle or bait. Conceivably there *are* living coelacanths in the Mediterranean and/or the eastern Atlantic. Perhaps no one has fished for them properly.

A Tethyan Relict?

During geologic time, the Atlantic Ocean was connected to the Indian Ocean through a much larger counterpart of the present-day Mediterranean Sea—the Tethys Sea—from the Lower Cambrian (about 550 to 600 million years ago) until the later Palaeozoic period (about 225 million years ago). Very possibly the coelacanths were broadly distributed from South Africa throughout the Tethys Sea and relict species remained behind in the Mediterranean when the continents changed during the late Tertiary to assume their present characteristics. It is also possible, although unlikely because of the rather deep-water habitat of the known living coelacanths, that individuals could have migrated through the Gulf of Aden, through the Red Sea, the Suez Canal, and into the Mediterranean. Even though the Suez Canal was not completed until 1869, and the silver coelacanth is believed to have been fashioned about a century ago, the faint possibility exists that a living coelacanth from off East Africa *could* have entered the Mediterranean after the completion of the Suez Canal. Other fish species from the Indian Ocean have made the passage into the Mediterranean, even though such cases are rare.

FOURTEEN YEARS *after the first specimen, this coelacanth was caught in the Comoro Islands, near Madagascar. Coelacanths are related to fish families which gave rise to the first animals which became adapted for living on land. (J. L. B. Smith)*

Still Wanted—Dead or Alive

The mystery of the silver coelacanth may never be solved, but marine scientists, archaeologists and paleontologists will speculate on this question until Dr. Reti or his colleagues, or perhaps one of our own Foundation members from the Mediterranean countries, unearths additional information. Hopefully, that historic day in 1938 will be relived as some angler or commercial fisherman in the Mediterranean catches a living coelacanth and saves it for science and mankind.